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51st ASLIB ANNUAL CONFERENCE

INFORMATION RESOURCES IN THE UK: THEIR CONTRIBUTION TO A NATIONAL INFORMATION SYSTEM

SESSION 2: COMMERCIALLY FUNDED SERVICES

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Contributions, which should be typewritten, double spaced, single-sided on A4 paper, and not more than 3,000 words in length, should be addressed to the Editor, *Aslib Proceedings*, 3 Belgrave Square, London SW1X 8PL. If possible, authors should include a summary of up to 200 words with the typescript. Authors will receive twenty-five offprints of their article free of charge.

Commercially funded on-line retrieval services—past, present, and future

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Santa Monica, California

Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September 1977

ON-LINE RETRIEVAL SERVICES of greater than local scope have now been in operation for approximately 12 years. Those years have seen dramatic changes in both the technical quality of the services available and in the sophistication of their use. And while many people believe that most of the basic capabilities that can be developed for on-line systems have already been developed, I tend to believe that the best is yet to come.

Kinds of on-line systems and data bases

There are many kinds of on-line systems. Some of them are in operation in banks; others in airline companies; others in food markets and car-rental agencies. Still others, of a somewhat different type, are in use in system development companies, universities, and governmental agencies, to help computer programmers to write their programs more efficiently by using on-line, interactive techniques.

The kind of system that I will be discussing today is the kind that helps a scientist, technician, administrator, librarian, information specialist or other intermediary, locate information rapidly and precisely in very large files (called 'data bases') stored in a computer. The data bases of interest to this audience are primarily bibliographic in nature. No one knows precisely how many such data bases there are, but Martha Williams has recently provided an estimate, shown in Figure 1.* About 58 per cent of the data bases that met her survey criteria originate in the United States. These tend to be fairly large data bases, as witness the fact that they represent 89 per cent of the total number of records.

Data bases differ in a number of respects, including size, but the two most important differences are probably content and the types of source documents they cover. Figure 2, also taken from Williams, shows that the largest single group of data bases is in the area of science and technology. I find it useful to think of data bases along somewhat different dimensions, grouping them into four basic types: scientific–technical, social science and humanities, business, and multidisciplinary.

---

* WILLIAMS, MARTHA E. Education and training for online use of data bases, in *User Education, European User Series 4*, EUSIDIC/ASLIB, 1977, p. 5–17.

Aslib Proceedings, 30 (1), January 1978, p. 2–15. Printed in Great Britain

	No Data Bases	% Data Bases	No Records	% Records
US	160	58	46.5M	89
Non-US	117	42	5.7M	11
	277	100	52.0M	100

FIG. 1: *Number of US/non-US data bases*

Examples of scientific–technical data bases are: Chemical Abstracts Condensates, BIOSIS Previews, Compendex, and INSPEC. Examples of social science data bases are: ERIC (education), Psychological Abstracts, and Social Science Citation Index. Examples of business data bases are: Accountants Index, Chemical Industry Notes, Pharmaceutical News Index, and World Patent Index. Examples of multidisciplinary data bases are: NTIS (National Technical Information Service), Comprehensive Dissertations Index, the data base of the Smithsonian Science Information Exchange, and Congressional Information Service Index.

Description of on-line searching

Users are connected to the system by means of a terminal. The terminal is coupled through a telephone into some sort of communications network, which puts the user in contact with a large time-sharing computer. This computer provides access to one or more bibliographic files, stored on magnetic disks, and users of the system are able to type in search inquiries and receive immediate responses in the form of citations or abstracts of current literature. In the case of lengthy bibliographies or large numbers of abstracts, users may prefer to have the responses printed off-line, on a high-speed printer. These off-line printouts are then mailed to the user.

Now what is the user actually doing and saying at the terminal? Figure 3 gives an example of a fairly simple search, done on SDC's ORBIT® system. The user types in, SACCHARIN AND CANCER. The system responds by saying that there are four records in the data base that cover both these topics. The user instructs the system to print the records and it does so.

This search can help to illustrate some important features of on-line retrieval systems.

	No Data Bases	% Data Bases
Scientific and Technical	161	58
Medical and Life Sciences	28	10
Non-Scientific and Technical	42	15
Scientific–Technical Related	46	17
	277	100

FIG. 2: *Types of data bases*

```
SS 1 /C?---SEARCH STATEMENT 1 OR COMMAND?
USER:
SACCHARIN AND CANCER

PROG:
PSTG---SEARCH STATEMENT 1--NUMBER POSTINGS (4)

SS 2 /C?---SEARCH STATEMENT 2 OR COMMAND?
USER:
"PRINT

PROG:

-1-
AN  - BA61-067735
TI  - NONNUTRITIVE SWEETENERS AND HUMAN BLADDER CANCER
      PRELIMINARY FINDINGS
AU  - KESSLER I I
SO  - J UROL (JOURA), 115 (2). 1976 143-146.

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AN  - BA60-026643
TI  - COFFEE DRINKING AND CANCER OF THE LOWER URINARY TRACT
AU  - SIMON D; YEN S; COLE P
SO  - J NATL CANCER INST (JNCIA), 54 (3). 1975 587-592.
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FIG. 3: *Sample search in BIOSIS data base*

1. They are fast. From the time the first search term was entered until the last word of the results came out, the process took only 40 seconds. If someone were to perform this search using only the manual index tools available in the typical library, the search time would be measured in hours or days. Some libraries might not be able to do such a search for a patron, or their response time might be a matter of weeks.
2. Their use can be very inexpensive. The cost of the BIOSIS search that I just described depends in part on which retrieval system you use. Some are faster and more responsive than others, and the rates for use vary somewhat from one system to another. Also, the telecommunications charges for the transatlantic connection with our computer in California vary from country to country. In Europe these charges are determined by the particular PTT involved. The total cost for doing this search on our system from London would be about $.53. From Lancaster, the cost would be about $.65, because of the added costs for telephoning to the London access mode. I hope you will agree that *$.65* or even 10 or 20 times that amount is not a very high price to pay for searching about a million bibliographic records and getting exactly the information you want printed out before you in a total time of *less than a minute*.
3. The third quality of on-line retrieval systems is the ability to obtain as much precision as the user desires, i.e. to obtain exactly the amount of information that is needed, with the degree of precision that is desired, without a great

```
            SS 1 /C?
            USER:
            DECISION:

            PROG:
            MM (DECISION:) (12)
                          1 DECISION (IT)
                          2 DECISION ANALYSIS (IT)
                          3 DECISION MAKING (IT)
                          4 DECISION MODEL (IT)
                          5 DECISION MODELS (IT)
                          6 DECISION SCIENCE (IT)
                          7 DECISION THEORY (IT)
                          8 DECISION TREE (IT)
                          9 DECISION-MAKING (IT)
                         10 DECISIONALLY (IT)
                         11 DECISIONMAKING (IT)
                         12 DECISIONS (IT)
            SPECIFY NUMBERS, ALL, OR NONE

            USER:
            3 9 11

            PROG:
            SS 1 PSTG (1409)

            SS 2 /C?
1 AND MARKETING AND FROM 1976 THRU 1977
```

FIG. 4: *Illustration of search-refinement process*

deal of extraneous information. This quality is a little difficult to illustrate unless you are somewhat familiar with the particular system being illustrated. But, since you have already followed one search, a somewhat more complex illustration will not be difficult to follow.

Figure 4 shows a search for a user interested in decision-making as related to marketing. For this search, I will use a data base called MANAGEMENT. This user is not quite sure how to express his search term, so he lets the system help him. The colon after DECISION tells the system that he is interested in documents indexed with any words beginning with DECISION. The computer tells him in a few seconds that there are 12 terms beginning that way. Which ones does he mean? The user replies that he means 3, 9, and 11, and the program then retrieves the requested items.

The user now adds the next concept—MARKETING—to the search, and he also tells the system that he does not want any documents earlier than 1976. Given this more precise statement of the user's needs, the system tells him that there are 86 documents that meet his specification. Figure 5 shows one of them. The user can print more of them, in whole or in part, or issue further expansions or refinements of his search prescription.

I hope it is clear that it is not the on-line system itself that produces precision.

```
-1-
AN  - MRE77B0004
TI  - SCOREBOARD FOR NEW PRODUCTS: HOW TO PICK A WINNER
AU  - FRECH, E.B.
SO  - MANAGEMENT REVIEW, VOL. 66, NO. 2, FEB 1977, P. 4-11.
UP  - 7702
IT  - DECISION MAKING; FACTOR ANALYSIS; MANUFACTURING; MARKETING; NEW
      PRODUCT; PRODUCT DEVELOPMENT; RESEARCH AND DEVELOPMENT; RISK;
      SALES VOLUME
AB  - A PRODUCT PROFILE CHART HELPS TO EVALUATE PROSPECTS FOR NEW
      PRODUCT DEVELOPMENT PROGRAMS BY RATING OPPORTUNITIES AGAINST
      FACTORS FOR SUCCESS IN AREAS OF MARKETING, MANUFACTURING AND
      RESEARCH AND DEVELOPMENT. CONSTANT COMPARATIVE REVIEW IS AN
      IMPORTANT PART OF THE DECISION PROCESS AND THE PRODUCT PROFILE
      CHART MUST BE UPDATED.
```

FIG. 5: *Partial results of search on management data base*

Rather, the precision comes from the ability of the user and system to converse with each other, letting the user inspect initial results, reformulate or refine his query, and inspect the new results. One can, of course, achieve the same kind of precision in a library or in a batch-type computer system. However, it would take much, much longer, and the user would undoubtedly find it embarrassing, expensive, and perhaps even dangerous to keep going back to the librarian or the batch system operator to announce the latest revisions to his search strategy.

4. The fourth important feature of on-line retrieval services is that they are democratic. While the University of Lancaster may have library resources that match those available in universities in London, Paris, New York and other major cultural centres, many cities and towns throughout the world do not. The availability of on-line retrieval services has the potential of serving as a great equalizer between information haves and information have-nots.

Some countries have been slower than others in exploring the potential of on-line information services, but the use of on-line techniques is now increasing at a very rapid rate throughout the world, and most particularly in Western Europe. There are now thousands of on-line users in the U.K., the Scandinavian countries, other European countries, the Middle East, Africa, Australia, Japan, South America, and on the North American continent. Most of the using organizations are libraries or information centres that serve, in total, a population of millions of scientists, techniques, and administrators. By next year at this time, on-line systems will have served millions of other end-users as well.

The growth of commercial services

There are at least fifteen on-line retrieval services of international scope or potential operating today. Of these, about twelve are based in the United States, where on-line technology developed most rapidy, beginning in the late 1950s.

The key technologies involved in on-line systems are time-shared computers, high-speed disk storage, and telecommunications. The computers perform the retrieval work for many users simultaneously, with the cost of the computer time-shared among the many users. The high-speed disk files are required to store the billions of words and numbers that make up a family of bibliographic data bases. For example, the BIOSIS Previews files stored in SDC's computer take up a total of 1,200,000,000 characters. This is the equivalent of about 200,000,000 English-language words. Almost any one of those words can be located by the computer in a disk in about 20 milliseconds (1/50 th of a second).

The early prototypes of on-line retrieval systems were developed by organizations in the private or commercial sector, sometimes with government funding contributions either to the initial development or to some of the subsequent improvements. For example, SDC's current ORBIT system grew out of a system developed by SDC scientists in the early 1960s and tested on a nationwide basis under the sponsorship of the US Department of Defense. Later we modified the system and sold a copy to the US National Library of Medicine, which gave it the name ELHILL. The National Library of Medicine in turn provided the ORBIT (or ELHILL) program to the British Library, which is using the program for BLAISE, the British Library Automated Information Service.

Most of the on-line retrieval services that are operating or are about to begin operating in Europe are government-sponsored, in whole or in part. In contrast, most of the major on-line systems based in the United States are commercially supported. This difference is a function of the American tradition of free enterprise which, in the field of on-line retrieval services, has proved to be very beneficial to users.

Figure 6 shows the major commercial on-line retrieval services based in the United States. Because they are privately sponsored, are not subsidized, and do not enjoy a protected monopoly position, they must be fully responsive to the needs of their users and offer data bases, system features, and service conditions that users want and need. Whenever one system offers a new feature or service condition that is attractive to users, the other systems must provide comparable features or services or risk losing some of their clientele to their competitors. The result of such competition has been the rapid growth of a number of important features or services. A few illustrations of features introduced by one or more organizations into their on-line systems during the past two years are:

- Expanded service hours (the major US systems operate a minimum of 15 hours a day)
- Search-saving capability
- Left-hand truncation capability
- Document-ordering capability
- Same-day off-line printing

Not all services offer all of these new features. Some offer only one or two.

At the same time that new system features and services have been introduced by the commercial on-line services, the range of the data bases available to the user from a single terminal has been increasing. Five years ago, the typical commercial on-line retrieval service offered users access to two or three data bases. By 1975, the number of data bases offered had grown to 15 or 20. Now, the major commercial services offer users 30 to 50 data bases and, by subscribing to several major services, users can have access to nearly 100 data bases. The user's problem is no longer one of obtaining access; it is one of selecting the combination of systems and data bases that is most appropriate for their needs or those of their clientele.

- BATTELLE MEMORIAL INSTITUTE
- BIBLIOGRAPHIC RETRIEVAL SERVICES
- INFORMATICS
- LOCKHEED
- MEAD CORPORATION
- NEW YORK TIMES DATA BANK
- OHIO COLLEGE LIBRARY CENTER
- SDC SEARCH SERVICE

FIG. 6: *Privately operated on-line services* (US)

One of the most important areas of change for users has been the declining cost of on-line searching. Operating a major commercial on-line retrieval service requires millions of dollars per year, with much of this money going to pay for computer, disk storage, and telecommunications equipment or services. But the costs of these components are declining every year and, in spite of the fact that the data bases themselves are constantly growing, requiring more disk storage space and more computer processing time, the average cost per search for using commercial systems has held steady or actually dropped.

But the thing that keeps making commercial on-line systems better and better is not computers or disk drives or telephone equipment. It is people—people in the on-line business who listen carefully to their on-line users to learn their needs and problems, people who translate these user needs into ideas for new program functions, and people who translate these ideas for new functions into the computer program code that provides the new capabilities.

It is important to note that what users want in 1977 is not the same as what they wanted in 1976, or 1975, or 1970. As they use sophisticated new capabilities, they think of even more powerful capabilities that would make searching easier or more effective. So the job of on-line service organizations like SDC is not simply to listen carefully and then build a single set of capabilities, once and for all. The cycle of feedback and system redevelopment is continuous and endless. That is one of the things that makes being in the on-line retrieval services industry fascinating and often totally exhausting.

I should point out that sophistication and power are attributes that can apply almost as much to data bases as they do to systems. Every supplier of on-line retrieval services starts from basically the same point: a magnetic tape received from an abstracting and indexing service. But from there, there are profound differences in the way each on-line service designs the data base for searching and display.

I will illustrate the point with the BIOSIS file. Figure 7 shows one record retrieved from our earlier search on SACCHARIN AND CANCER. You will recall that we found four relevant citations. If we examine this citation carefully, we notice that there are a number of other terms that might be, and perhaps should have been, used as search terms for our saccharin-and-cancer search. For example, the title reminds us to consider the concept of sweeteners or sweetening; the index-term field makes us consider the idea of expanding our search to include cyclamates and to use the word carcinogens in addition to cancer; and a field we call Category Codes, based on the BIOSIS Taxonomic Codes, tells us that using the code 24007 will help us to locate literature on neoplasms, neoplastic agents, and carcinogens. These words do not appear on the standard tape that we receive from BIOSIS. We deliberately create this field, using dictionary information provided to us by BIOSIS on a totally separate tape. Doing so expands our cost of processing and storage, but it provides an invaluable aid to the user, who can learn directly and immediately what the Category Codes he sees mean, and can translate this information into a more successful search.

Figure 8 shows a summary of the new search. Search Statement 1 was our original search, which nettled four citations. New Search Statement 2 expands

```
SS 2 /C?---SEARCH STATEMENT 2 OR COMMAND?
USER:
"Print 1 FULL"

PROG:

-1-
AN  - BA61-067735
TI  - NONNUTRITIVE SWEETENERS AND HUMAN BLADDER CANCER PRELIMINARY
      FINDINGS
AU  - KESSLER I I
SO  - J UROL (JOURA), 115 (2). 1976 143-146.
CC  - *24007 (NEOPLSMS/NEOPL AGNTS-CARCINOGENS); 07004 (BEHAVIOR
      BIOL-HUMAN BEHAVIOR); 10060 (BIOCHEM STUD-GENERAL); 10068
      (BIOCHEM STUD-CARBOHYDRATES); 12503 (PATHOLOGY-COMPARATIVE);
      12504 (PATHOLOGY-DIAGNOSTIC); 13004 (METABOLISM-CARBOHYDRATES);
      13020 (METABOLISM-METABOLIC DISORDERS); *13532 (FOOD
      TECH-PREP,PROCESSING,STORAGE); 15501 (URIN SYST/EXTERN SECR-GEN
      STUD,METH); *15506 (URIN SYST/EXTERN SECR-PATHOLOGY); 17008
      (ENDOCRINE SYST-PANCREAS); 19001 (DENTAL/ORAL BIOL-GENL
      STUD,METHS); 21004 (PSYCHIATRY-ADDICTION (INC SMOKNG)); 22100
      (ROUTES OF IMMUNIZ,INFECT,THERAP); 22501 (TOXICOL-GENL/EXP
      STUDS,METHS); *22502 (TOXICOL-FOOD,RESIDS,ADDIT,PRESRV); 24001
      (NEOPLSMS/NEOPL AGNTS-DIAGNS METH); 51522 (PLANT PHYSIOL-CHEM
      CONSTITUENTS)
TC  - 11000 (PLANTAE-UNSPECIFIED); 86215 (HOMINIDAE)
IT  - SACCHARIN CYCLAMATE CARCINOGENS SMOKING
```

FIG. 7: *Sample BIOSIS search (full citation)*

```
SS 6 /C?
USER:
"HISTORY

PROG:
SS 1: SACCHARIN AND CANCER (4)
SS 2: SACCHARIN OR ALL SWEETEN: OR ALL CYCLAMATE. (315)
SS 3: CANCER OR ALL CARCINOGEN: OR 24007 (33008)
SS 4: 2 AND 3 (36)
```

FIG. 8: *Summary of BIOSIS search*

the saccharin concept to include all terms beginning with SWEETEN or all terms beginning with CYCLAMATE. This gives us 315 documents. In Search Statement 3, we expand the cancer concept to include all terms beginning with CARCINOGEN and we also include the category code 24007, which we discovered a moment ago. The result of this Search Statement is 33,008 citations. The final result is 36 documents, nine times as many as the initial, simple search. I am sure that a searcher familiar with biological literature and nomenclature would be able to locate even more relevant citations with no difficulty.

The future

What can we expect to see five or ten years from now? In one sense, the answer is 'more of the same.' There will be more data bases, more systems, longer service hours, faster printout service, lower prices per search, and additional new system features.

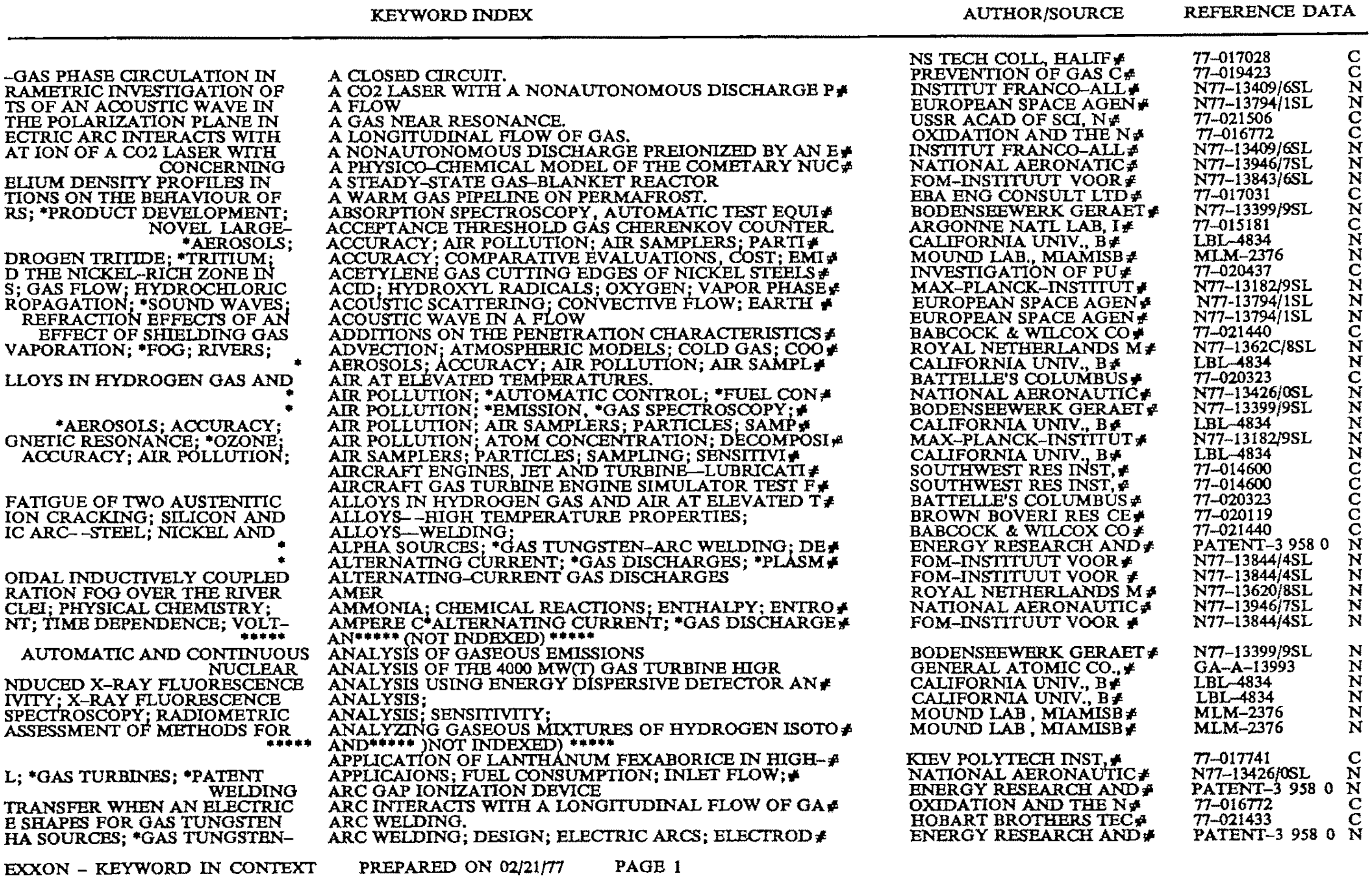
We may also see a levelling out of capabilities, from one system to the next, as the higher speeds of computers erode some of the advantages in response time now enjoyed by the better designed and more efficient retrieval programs. When this happens, more and more emphasis will be placed on the quality of customer service and on the things that make some systems easier or cheaper to use than others, or that provide added dividends to the user.

What are some examples of such things? One of them is already in experimental use and will soon be in full public use. It does not yet have a recognized name, but I will refer to it as the On-line KWIC Index.

Imagine that you are the information manager of a company employing several hundred engineers and that there is a certain type of literature information that you believe they should have at their fingertips, in a form that would let them look up quickly and precisely the information that they need, over some period of time.

The On-line KWIC Index is one way of meeting this need. Figure 9 shows such an index that, with permission of the data base suppliers, has been generated from two on-line files available on ORBIT system: NTIS and COMPENDEX. Each line is a title from one of these data bases. SDC's special KWIC program has rotated each of the titles, bringing a new word into the lookup position, as in all KWIC indexes.

What is novel about the On-line KWIC Index is that the user selects the items



KEYWORD INDEX		AUTHOR/SOURCE	REFERENCE DATA	
		NS TECH COLL, HALIF#	77-017028	C
-GAS PHASE CIRCULATION IN	A CLOSED CIRCUIT.	PREVENTION OF GAS C#	77-019423	C
RAMETRIC INVESTIGATION OF	A CO2 LASER WITH A NONAUTONOMOUS DISCHARGE P#	INSTITUT FRANCO-ALL#	N77-13409/6SL	N
TS OF AN ACOUSTIC WAVE IN	A FLOW	EUROPEAN SPACE AGEN#	N77-13794/1SL	N
THE POLARIZATION PLANE IN	A GAS NEAR RESONANCE.	USSR ACAD OF SCI, N#	77-021506	C
ECTRIC ARC INTERACTS WITH	A LONGITUDINAL FLOW OF GAS.	OXIDATION AND THE N#	77-016772	C
AT ION OF A CO2 LASER WITH	A NONAUTONOMOUS DISCHARGE PREIONIZED BY AN E#	INSTITUT FRANCO-ALL#	N77-13409/6SL	N
CONCERNING	A PHYSICO-CHEMICAL MODEL OF THE COMETARY NUC#	NATIONAL AERONATIC#	N77-13946/7SL	N
ELIUM DENSITY PROFILES IN	A STEADY-STATE GAS-BLANKET REACTOR	FOM-INSTITUUT VOOR#	N77-13843/6SL	N
TIONS ON THE BEHAVIOUR OF	A WARM GAS PIPELINE ON PERMAFROST.	EBA ENG CONSULT LTD#	77-017031	C
RS; *PRODUCT DEVELOPMENT;	ABSORPTION SPECTROSCOPY, AUTOMATIC TEST EQUI#	BODENSEEWERK GERAET#	N77-13399/9SL	N
NOVEL LARGE-	ACCEPTANCE THRESHOLD GAS CHERENKOV COUNTER.	ARGONNE NATL LAB, I#	77-015181	C
*AEROSOLS;	ACCURACY; AIR POLLUTION; AIR SAMPLERS; PARTI#	CALIFORNIA UNIV., B#	LBL-4834	N
DROGEN TRITIDE; *TRITIUM;	ACCURACY; COMPARATIVE EVALUATIONS, COST; EMI#	MOUND LAB., MIAMISB#	MLM-2376	N
D THE NICKEL-RICH ZONE IN	ACETYLENE GAS CUTTING EDGES OF NICKEL STEELS#	INVESTIGATION OF PU#	77-020437	C
S; GAS FLOW; HYDROCHLORIC	ACID; HYDROXYL RADICALS; OXYGEN; VAPOR PHASE#	MAX-PLANCK-INSTITUT#	N77-13182/9SL	N
ROPAGATION; *SOUND WAVES;	ACOUSTIC SCATTERING; CONVECTIVE FLOW; EARTH #	EUROPEAN SPACE AGEN#	N77-13794/1SL	N
REFRACTION EFFECTS OF AN	ACOUSTIC WAVE IN A FLOW	EUROPEAN SPACE AGEN#	N77-13794/1SL	N
EFFECT OF SHIELDING GAS	ADDITIONS ON THE PENETRATION CHARACTERISTICS#	BABCOCK & WILCOX CO#	77-021440	C
VAPORATION; *FOG; RIVERS;	ADVECTION; ATMOSPHERIC MODELS; COLD GAS; COO#	ROYAL NETHERLANDS M#	N77-1362C/8SL	N
*	AEROSOLS; ACCURACY; AIR POLLUTION; AIR SAMPL#	CALIFORNIA UNIV., B#	LBL-4834	N
LLOYS IN HYDROGEN GAS AND	AIR AT ELEVATED TEMPERATURES.	BATTELLE'S COLUMBUS#	77-020323	C
*	AIR POLLUTION; *AUTOMATIC CONTROL; *FUEL CON#	NATIONAL AERONAUTIC#	N77-13426/0SL	N
*	AIR POLLUTION; *EMISSION, *GAS SPECTROSCOPY;#	BODENSEEWERK GERAET#	N77-13399/9SL	N
*AEROSOLS; ACCURACY;	AIR POLLUTION; AIR SAMPLERS; PARTICLES; SAMP#	CALIFORNIA UNIV., B#	LBL-4834	N
GNETIC RESONANCE; *OZONE;	AIR POLLUTION; ATOM CONCENTRATION; DECOMPOSI#	MAX-PLANCK-INSTITUT#	N77-13182/9SL	N
ACCURACY; AIR POLLUTION;	AIR SAMPLERS; PARTICLES; SAMPLING; SENSITIVI#	CALIFORNIA UNIV., B#	LBL-4834	N
	AIRCRAFT ENGINES, JET AND TURBINE—LUBRICATI#	SOUTHWEST RES INST,#	77-014600	C
	AIRCRAFT GAS TURBINE ENGINE SIMULATOR TEST F#	SOUTHWEST RES INST,#	77-014600	C
FATIGUE OF TWO AUSTENITIC	ALLOYS IN HYDROGEN GAS AND AIR AT ELEVATED T#	BATTELLE'S COLUMBUS#	77-020323	C
ION CRACKING; SILICON AND	ALLOYS--HIGH TEMPERATURE PROPERTIES;	BROWN BOVERI RES CE#	77-020119	C
IC ARC--STEEL; NICKEL AND	ALLOYS—WELDING;	BABCOCK & WILCOX CO#	77-021440	C
*	ALPHA SOURCES; *GAS TUNGSTEN-ARC WELDING; DE#	ENERGY RESEARCH AND#	PATENT-3 958 0	N
*	ALTERNATING CURRENT; *GAS DISCHARGES; *PLASM#	FOM-INSTITUUT VOOR#	N77-13844/4SL	N
OIDAL INDUCTIVELY COUPLED	ALTERNATING-CURRENT GAS DISCHARGES	FOM-INSTITUUT VOOR #	N77-13844/4SL	N
RATION FOG OVER THE RIVER	AMER	ROYAL NETHERLANDS M#	N77-13620/8SL	N
CLEI; PHYSICAL CHEMISTRY;	AMMONIA; CHEMICAL REACTIONS; ENTHALPY; ENTRO#	NATIONAL AERONAUTIC#	N77-13946/7SL	N
NT; TIME DEPENDENCE; VOLT-	AMPERE C*ALTERNATING CURRENT; *GAS DISCHARGE#	FOM-INSTITUUT VOOR #	N77-13844/4SL	N
*****	AN***** (NOT INDEXED) *****			
AUTOMATIC AND CONTINUOUS	ANALYSIS OF GASEOUS EMISSIONS	BODENSEEWERK GERAET#	N77-13399/9SL	N
NUCLEAR	ANALYSIS OF THE 4000 MW(T) GAS TURBINE HIGR	GENERAL ATOMIC CO.,#	GA-A-13993	N
NDUCED X-RAY FLUORESCENCE	ANALYSIS USING ENERGY DISPERSIVE DETECTOR AN#	CALIFORNIA UNIV., B#	LBL-4834	N
IVITY; X-RAY FLUORESCENCE	ANALYSIS;	CALIFORNIA UNIV., B#	LBL-4834	N
SPECTROSCOPY; RADIOMETRIC	ANALYSIS; SENSITIVITY;	MOUND LAB , MIAMISB#	MLM-2376	N
ASSESSMENT OF METHODS FOR	ANALYZING GASEOUS MIXTURES OF HYDROGEN ISOTO#	MOUND LAB , MIAMISB#	MLM-2376	N
*****	AND*****)NOT INDEXED) *****			
	APPLICATION OF LANTHANUM FEXABORICE IN HIGH-#	KIEV POLYTECH INST,#	77-017741	C
L; *GAS TURBINES; *PATENT	APPLICAIONS; FUEL CONSUMPTION; INLET FLOW;#	NATIONAL AERONAUTIC#	N77-13426/0SL	N
WELDING	ARC GAP IONIZATION DEVICE	ENERGY RESEARCH AND#	PATENT-3 958 0	N
TRANSFER WHEN AN ELECTRIC	ARC INTERACTS WITH A LONGITUDINAL FLOW OF GA#	OXIDATION AND THE N#	77-016772	C
E SHAPES FOR GAS TUNGSTEN	ARC WELDING.	HOBART BROTHERS TEC#	77-021433	C
HA SOURCES; *GAS TUNGSTEN-	ARC WELDING; DESIGN; ELECTRIC ARCS; ELECTROD#	ENERGY RESEARCH AND#	PATENT-3 958 0	N

EXXON - KEYWORD IN CONTEXT PREPARED ON 02/21/77 PAGE 1

FIG. 9: ORBIT *on-line* KWIC *Index*

```
AHORA USTED ESTA JUNTADO AL ARCHIVO DE MANAGEMENT

SS 1 /C---BUSQUEDA DECLARACION 1 O ORDEN
USANO:

FRAUD OR THEFT OR CRIME

PROG:
SS 1 PSTG---BUSQUEDA DECLARATION 1 CITACIONES (319)

SS 2 /C?---BUSQUEDA DECLARACION 2 O ORDEN
USANO:

2 Y TODO COMPUT:

PROG:
SS 2 PSTG---BUSQUEDA DECLARATION 2 CITACIONES (28)

SS 3 /C?---BUSQUEDA DECLARATION 4 O ORDEN
USANO:
"IMPRIMA 10 TITULOS

-1-
TI - MINI-CRT TERMINALS SIMPLIFY SIGNATURE VERIFICATION TASK

-2-
TI - CLOSING THE COMPUTER AUDIT GAP
```

FIG. 10: *Sample search on management data base (version Español)*

to be indexed, through a regular on-line search. The search can cover any number of data bases, and the On-line KWIC program will merge them into a single unified KWIC Index that is used as an index to items printed off-line in separate bibliographies. Subject to copying limitations by some data base suppliers, the user can make dozens or hundreds of copies of the output to provide desk-top reference aids to the personnel who need them, for the next week, month, or other selected period of time, until the next On-line KWIC Index is run.

The On-line KWIC Index is essentially a new tool, a new form of printout that depends on basically the same kind of search that one uses today for all searches. User reaction to it has been excellent. I refer you to a report by Barbara Lawrence, of the EXXON Corporation, who describes how EXXON scientists and engineers make effective use of this tool.*

Quite another type of system improvement will come increasingly into view in the next several years: the personalized system. Such a system is illustrated in Figure 10. The search topic is computer fraud and the data base is MANAGEMENT. The citations issuing from the computer are in the original language

---

* LAWRENCE, BARBARA. Preparation of desk-top literature indexes for ongoing research projects brief communication. *Journal of the American Society for Information Science*, July–August, 1976.

```
                         STANDARD ORBIT
HELLO FROM SDC/ORBIT. (09/21/77  1:30 A.M.  PACIFIC TIME)
YOU ARE NOW CONNECTED TO THE ORBIT DATABASE.

ARE YOU A NEW USER? IF YES ENTER Y.  IF NO ENTER N OR A COMMAND.

"FILE MANAGEMENT

PROG:
ELAPSED TIME ON ORBIT: 0.01 HRS.
YOU ARE NOW CONNECTED TO THE MANAGEMENT DATABASE.
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                          ORBIT ESPAÑOL

HOLA DE SDC/ORBIT. (09/21/77  0930 TIEMPO LOCAL)
AHORA USTED ESTA JUNTADO AL ARCHIVO DE ORBIT

ES USTED UN USANO NUEVO? SI SI, REGISTERE S.  SI NO,
REGISTERE N O UN ORDEN.

"ARCHIVO MANAGEMENT

PROG:
TIEMPO TRANSCURRIDO EN ORBIT: 0.01 HORAS
AHORA USTED ESTA JUNTADO AL ARCHIVO DE MANAGEMENT
```

FIG. 11: *Alternative system responses to logging in from Los Angeles (top) and Madrid*

but the language of communication between the user and the computer is now Spanish. The user needs to be able to understand written English in order to use the search results, but he can conduct the discourse in a more familiar tongue.

What is important about this capability is not that the computer is conversing in Spanish, but that it may be speaking Spanish to one user, German to another, Italian to another, at the same time that it is speaking English to users in the UK, the United States and the western part of Canada. The other thing that is important is that the computer will remember how each user wants ORBIT to behave and how to converse and will automatically adopt the mode that the user has requested, every time the user logs in.

Language is, of course, only one way in which a system can be personalized by the user for his or her use. There are many others, illustrated in the next figure.

The top part of Figure 11 shows a typical login. The system says hello and asks for instructions. The user tells the system to provide the MANAGEMENT file (data base). The bottom half of Figure 11 shows how the system might respond to this user, after the user has personalized the system for his special needs and his location. Instead of giving Pacific Daylight Time, the system outputs the user's local time.

One can imagine still other, more important differences that can be controlled entirely by the user. For example, video-display terminals are becoming less and less expensive and more and more portable, but the more portable terminals generally have a smaller screen capacity. The user may need to ask the system to output lines of 40 characters width or 47 or 63, or any number, instead of the standard length of 72 characters usually used for standard printer-type terminals.

What we have here is the concept of the profile, expanded from the content-orientated tailoring associated with SDI profiles to the tailoring of the system itself, on-line, by the user.

Of course, there will be many other changes that will simplify the use of on-line systems. We will certainly have on-line aids to help the searcher user select data bases from the hundreds that are available. There will almost certainly be mechanisms for translating the user's entry terms into controlled vocabulary terms in the data base. And we will probably see the beginning of mechanisms for translating the terms in one system's command language into the terms required by another system with which the user is less familiar.

We can also expect to see greater vertical integration within the information retrieval services industry, with a blurring of the line that exists between data base publishers and on-line service suppliers. The current relationship between these two groups is currently very complex and will become more so before a simpler and more stable long-term relationship begins to emerge.

Conclusion

Many of the current users of on-line services have been witnesses to the birth and growing pains of these services. After all, such services have grown up only within the past 12 years. Because on-line technology is growing so rapidly, many of you will also witness most if not all of the new tools, mechanisms, and trends I have been reviewing. Some of these will be here within a matter of a few years. Some may even be here in months. I hope that any of you who do not now use on-line services will plan to give them closer attention. Like our young children, who grow up and leave the home before we realize it, on-line retrieval services may mature and change so rapidly that we may miss observing some of the most fascinating and pervasive developments in the field of library and information science in the past decade.

Long-term economics of on-line services and their relationship to conventional publishers seen from the data base producers' viewpoint

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ALTHOUGH I WORK for ISI, I would like to stress that my views as given in this paper do not necessarily represent ISI's views; similarly, facts and figures I shall extrapolate are not necessarily based on those of ISI.

I would like to stress that, throughout this paper, I am referring to the economics of *bibliographic* data bases; data banks have their own somewhat different economics, and are used more by the non-library market where different economic factors apply.

We are going to start by looking at the costs involved in establishing a data base, and here we promptly meet two problems: firstly, data base producers have always been extremely coy about releasing precise costs, and, secondly, data base producers are not a clearly defined group of people with clearly defined costs. To tackle the second problem first, who are the data base producers?

Data base producers

I think data base producers fall basically into three major categories; the 'for profits', the 'for funs' and the 'from duties'. Under the 'for profits' we can include data base producers like ISI, Derwent, Data Courier and Predicast. These are people who invest money into the production of data bases on the normal commercial basis of expecting to make normal commercial profits on their investments.

Under the 'for funs' we can include data base producers like Inspec or the CNRS or the American Chemical Society—people who do not have to produce data bases simply to earn profits, nor are obliged by laws or statutes to produce a data base.

Under the 'from duties' we can include all the data base organizations set up by government or international legislation with the duty of providing a data base—data bases like AGRIS, Medlars or INIS.

Now whilst it is not difficult to appreciate that, in the final analysis, all data base producers must face the same costs—development, staff, equipment and accommodation—it is unfortunately true that only 'for profit' producers usually

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have of necessity to face 100 per cent of all the costs; data base producers from the other sectors are often able to disguise many of their costs by, for instance, taxpayer grants to pay for feasibility studies and development costs, or use of a central government computer at preferential rates, or use of specialized staff or general accommodation at rates below the current market price. Thus, 'cost recovery' in the 'for fun' and 'from duty' sectors frequently means recovery of direct operating costs or, often, recovery of any costs not paid by the taxpayer. But be these costs recovered from users, obtained from the taxpaying public or vaguely 'laundered' in the overall accounts, let us recognize that the basic costs of producing a data base must always be there.

Costs of producing a data base

What are the costs? Here we run up against the absence of reliable published figures—particularly figures from the 'for profit' sector where, as we have seen, 100 per cent of the true costs are usually easy to determine. Let us look at two examples, one based on estimates given in 1971 by Stevens of Informatics Inc.[1] and the other based on a commonsense estimate of some of the essential figures. But one word of warning on the figures—they are estimated and they do not affect the conclusions we will later draw, even if they are wrong by a factor of 10.

First of all, on Stevens' figures; he estimated data base input charges (covering cataloguing, indexing, abstracting, keyboarding, editing and reviewing) at between $10 and $20 per citation. Taking a moderate sized data base of 350,000 entries per year, and adding $500,000 to cover marketing costs, CPU costs, printing costs and journal purchasing, and taking Stevens' lowest $10 per citation figure, we arrive at a figure of $4m per year as the cost of the data base to the data base producer, even taking the lowest of Stevens' 1971 costs (Figure 1).

Alternatively, we can attempt our own cost breakdown. Paying 200 staff a total salary and fringes bill of $2m p.a. allocating $500,000 for marketing, journal purchase and printing, $250,000 for CPU time, $150,000 for lease of key-to-disk equipment and $600,000 for overheads. Excluding the amortization of any development costs, the total data base cost to the data base producer comes to $3.5m p.a. (Figure 2).

As I said, the *exact* figures do not matter, as we will now see. But, to avoid accusations of using inflated figures, let us bear in mind that $3m p.a. (rather than $3.5m or $4m) is a conservatively realistic figure for the annual cost of a major data base, and turn for a second to the on-line situation.

On-line costs

I am going to talk about on-line as costing $80 per hour in Europe. The $80 per hour breaks down here into $30 per hour file cost, $20 per hour to the PTTs, $20 per hour to the host computer and $10 per hour to cover equipment, training and terminal operator. These are rough-and-ready figures and vary enormously, but I think that, in Europe, they represent a fair average.

We can note in passing, however, that data base charges vary, at the higher end, from $150 per hour (CLAIM/SCHEM on Lockheed), $90 per hour (ENVIROLINE on Lockheed) or $110 per hour (SSIE on SDC)—all excluding

	$,000
350,000 citations p.a. at $10 per entry	3,500
Marketing / CPU / printing / journal purchasing	500
Total data base cost	4,000

FIG. 1: *Cost of establishing machine-readable data base*

telecommunications. We can also note that $20 per hour for telecommunications in Europe is certainly a lot less than most people are currently paying. However, again, I take a total $80 per hour as being a reasonably conservative figure applying to most bibliographic data base users—lower North American telecommunications charges also make the lower figure more realistic internationally. Let us note in passing that only one quarter of our $80 per hour goes to the host computer; although we all talk wistfully about increasing usage and lower storage costs bringing down prices, storage is only one element of the host computer's costs and costs associated with staff, equipment, marketing and training will always remain. I doubt whether on-line is going to fall dramatically below the $80 per hour figure in Europe; as we shall see, any slack in the tariff can easily be taken up by increasing the data base producers' $30 per hour suggested above. As is well known, all major bibliographic data base producers at present get very well over 90 per cent of their revenue from their printed services; on-line at present provides mere gravy—thick gravy or thin gravy, depending on the database. It is when we bring together our $3m estimated minimum costs and the $80 per hour on-line charge that data base producers start to worry. Why is this? Our annual costs for the data base is $3m. Our happy 1,200 subscribers worldwide each pay $2,500 p.a. for our printed indexes, and our income of $3m p.a. covers our costs. The total cost of our data base to the library and information market worldwide is $3m p.a. which they all pay happily (Figure 3).

But, enter the villain! In the early 1980s, libraries no longer buy indexes because they all have terminals and use required files on-line. What happens to our economics? The annual cost of our data base is still $3m. At a not unusual $20 per hour royalty, we need 150,000 hours of usage to get back our $3m costs.

	$,000
200 staff at $10,000 p.a. each (incl. fringes)	2,000
Marketing, printing and journal purchase	500
CPU time	250
Input equipment	150
Building/overheads	600
Total data base cost (excludes system development/programming/launch)	3,500

FIG. 2: *Cost of establishing machine-readable data base*

XYZ Database
Annual cost: $3m
Printed Indexes: 1,200 subscribers at $2,500 p.a.
Cost of data base to library world: $3m p.a.

FIG. 3

XYZ Data base
Annual cost: $3m
On-line form: 150,000 hours p.a. at $20 royalty per hour = $3m p.a.
Cost of data base to library world: (150,000 × $80) = $12m p.a.

FIG. 4

Apart from anything else, 150,000 hours per year usage on one file is way, way beyond current usage of even the most major of major files. But, even worse, the international library and information users, who previously have jointly paid $3m per year to use this data base, now have to find $12m per year to use the same data base on-line, since 150,000 hours at $80 per hour comes to this amount (Figure 4).

Impossible! Let's change the figures!

XYZ Data base
Annual cost: $3m
On-line form: 75,000 hours p.a. at $40 royalty per hour = $3m p.a.
Cost of data base to library world: (75,000 × $80) = $6m p.a.

FIG. 5

We still have our annual cost of $3m. The data base producer has raised his royalty to $40 per hour and Noel Isotta, Roger Summit, Carlos Cuadra and the PTTs have all lowered their charges and improved their productivity to enable the file still to total no more than $80 per hour to the user. We now need only (only?) 75,000 hours of usage per year (a pretty steep demand). Since the international information community is using 75,000 hours a year at $80 per hour, the international community is now paying $6m p.a. for use of one data base for which it previously paid $3m p.a. (Figure 5).

Now it may be that the international library and information community has vast amounts of surplus money, and that increases from $3m paid out for one data base to $6m or $12m are not of concern compared to the pleasures of being on-line. If the international information community is so affluent, it is very good

		$,000
XYZ Data base		
Annual cost: $3m		
Printed Indexes: 700 subscribers at $3,000 p.a.		2,100
On-line form: 30,000 hours p.a. at $30 royalty per hour		900
Data base revenue		3,000
Cost to library world:	printed form	2,100
	on-line form: (30,000 × $80)	2,400
Total cost of data base to library world		4,500

FIG. 6

at disguising it—few members of it give the impression that doubling or quadrupling their budgets presents no problem. Now one may well ask, with the advent of middle-men in the form of PTTs and host computers and the improbability of the information community absorbing the two- or four-fold increases in data base charges, why are database producers not beginning to diversify out of data bases into something more secure? Because the charges will have to be absorbed if users opt overwhelmingly for on-line—absorbed either by users, or by governments increasing taxes on cars, old ladies' walking sticks or what have you. I think that the reason is that no data base producer sees on-line as such a dramatic revolution, and Figure 6 will illustrate a more probable future.

Here we have our familiar annual data base cost of $3m. We still have our loyal band of subscribers to the index, shrunken from the previous 1,200 to 700. The 700 are now paying $3,000 p.a. for the index compared to the previous 1,200 who only paid $2,500 p.a.

We also have a body of on-line users, using 30,000 hours p.a. on the data base and contributing $900,000 p.a. towards the cost of the data base. Via its index purchases, the information world contributes $2.1m towards the data base cost. Because of the Catch 22 with the host computer and PTTs, it spends a further $2.4m on-line. The total data base cost to the information world is now $4.5m p.a. of which the producer is happy with his $3m.

There is no point in someone standing up and asking how, in times of inflation and budget cuts, his library is expected to increase its spending on information. The choice belongs entirely to the information market-place; if the information users want on-line they in future have to pay not only the data base producers but the PTTs, storage and interactive computing, and this must cost more.

My next point interests me and illustrates the incredible apparent paradox, that it is in the interests of the information community to press for high royalties for data base producers within on-line systems. I see some sceptical faces, but let us quickly flash back to our $20 per hour royalty, (Figure 4) and recall that, to ensure the continuance of the data base, the user community had to spend $12m per annum and use the data base for a record 150,000 hours per year.

If we now award our data base producers no less than $100 per hour royalty, we find that the user community only need spend $4.5m per year to ensure the continuance of the data base on a more realistic usage of 30,000 hours per year (Figure 7). Of course, the old $80 per hour on-line rate has now become $150 p.a. but the user community has not really lost. In other words, the lower the data base producer's royalty, the more money the information community has to spend if a given data base is to survive, and vice versa.

We can now understand one reason why, at on-line conferences, data base producers are often bubbling with less enthusiasm than their users; bibliographic data base producers realise that a wholesale switch from printed indexes to on-line could result in considerably higher costs to users if the data base is to be able to continue in economic terms. The danger is that users will tailor their on-line usage to fit within their existing information budgets and, rather than make the two- or four-fold increases in their expenditure on indexing services necessary to change over to on-line, will give the on-line data base producer only a third or a fifth of the usage he requires to enable him to cover the costs of his data base. Here (Figure 8) the user community has kept within its budget and still spends $3m p.a. to obtain the data base. But the producer now has only $1,125m p.a. income (at a royalty of $30 per hour) to meet his expenses of $3m per year. He would find it difficult, on these figures, to get a bank loan to cover the deficit!

The observant amongst you will notice that I have excluded all mention of profit for the data base producer, although many of us do not create data bases just for fun and, even those like INSPEC who do, need surplus revenue to generate improvement or refinements of one kind or another. I have excluded profit because I take it as accepted that, for most data bases, it has to come in somewhere on top of the figures I have suggested. However, I have also left out one other cost element—royalties from off-line printing, which can go to data base producers. To avoid complicating our already hypothetical costs any further, let us make a simple equation and hypothesize that off-line print royalties = data base producers' profits/re-investment capital = extra charge to user community not mentioned in the cost figures at which we have been looking. I think the extreme figures I have indicated do paint an extreme position. I believe that printed indexes and on-line terminals are often complementary rather than mutually exclusive and that the mix of print and terminal will be with us for a long time. Some major advantages of printed indexes are their cost—a $3,000 index can be used over and over for years by innumerable users in a major library, whereas $3,000 will only buy around 38 hours of on-line

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XYZ Data base
Annual cost: $3m
On-line form: 30,000 hours p.a. at $100 royalty per hour = $3m
Cost to library world: (30,000 × $150) = $4.5m

FIG. 7

P1514

XYZ Data base
Data base cost: $3m
37,500 hours p.a. usage at $30 royalty per hour = $1,125m
Cost to users: (37,500 × $80) = $3m

FIG. 8

searching. Printed indexes also invariably go back far longer into the less frequently used years for long retrospective searches and, for some searches, printed indexes are easier and quicker to use than on-line searches. Finally, printed indexes are often superior to on-line when it comes to a browsing search in many data bases.

So, eventually, I believe we will settle down to a mix that is economically healthy for both producers and users. The areas of concern here for producers must be the fear that the pendulum will swing too far one way before a more 'normal' mix asserts itself.

The second reason why the picture is not as black as painted is that a good deal of usage comes inevitably from the USA where the PTTs are not in a position to imitate the greed of the European PTTs. Instead of up to $44 per hour total claimed by the European PTTs, Tymshare and Telenet in the USA usually only appropriate $5–$8 of our $80. In the USA, therefore, the user community need spend less to ensure the data base producer of the return of his $3m costs.

The third reason for hope is my feeling that, over the next five to fifteen years, the information and data explosion will ensure that all managers and decision makers become used to retrieving data and information on-line as a matter of course—both in-house information and, by logical extrapolation, outside information. One current problem from which most information services suffer is that information is too often something to be obtained for research personnel out of a library budget originally designed for books and journals. To too many managers and decision makers, 'information' is something specialized, unconnected with the daily life of the company, the university or the institution. I believe this will change over the next five to fifteen years and that both users and producers will be freed from the strait-jacket of 'the library budget'. If a manager has a terminal from which he frequently obtains sales statistics, transportation rates, telephone numbers, exchange rates and thermonuclear data, it is not hard to envisage a climate for an acceptable dramatic growth in the overall use of on-line services and expenditure on them. One should also not ignore the fact that advanced companies like Unilever, ICI, Shell, Philips, etc. (in Europe) have moved into on-line retrieval, not to be fashionable but because in a *cost-effective* environment their studies on on-line retrieval have shown that in many cases and in many files (though not in all cases and in all files) on-line brings an important cost-benefit. We must, however, recognize that criteria of cost-effectiveness that apply in the research environment of private industry are often far from public-financed sectors' criteria of cost-effectiveness. But I believe that, over the next two decades, the cost-effectiveness of new generations of on-line files will be more widely recognized and that on-line use will steadily widen. And I mean 'widen' as opposed to simply 'increase'.

Conclusion

To conclude this brief survey of the economic climate for on-line interactive services, I believe the future is good but that both *data base users and producers* need to bear carefully in mind *now*, the fragile economics of the immediate future—otherwise we will have more examples of catastrophic un-wisdom such as Georges Anderla's suggestion that, within Euronet, data base producers would expect royalties of \$8–\$10 per hour.[2]

In this session that I inherited, the title mentioned 'conventional publishers' in the on-line context, and I would like to finish with a few personal observations on this subject.

To conventional publishers—i.e. primary publishers—the growth of indexing and abstracting services and the extension of these services via universally available on-line systems, is a mixed blessing. On one hand, since primary publishers provide what any user ultimately needs, they are always in a strong position. Furthermore, indexing and abstracting services conveniently and painlessly take away from a primary publisher one of his most expensive headaches—how to advise the user community that this journal contains valuable work or that book some key summaries by important and influential researchers. In this sense, information services do a publisher's promotional work for him—free of charge.

Whether or not the book or journal faces extinction in an electronic future is a separate paper—I agree with Dr Garfield that the best journals will survive in some form, at least in the foreseeable future.[3] Where, of course, primary publishers are worst hit is at present in competition for funds from finite library and information budgets. In many libraries of the world, book buying has practically faded away whilst primary journals and indexing systems compete for finite budgets.[4] The coming of on-line, with PTTs and host computers competing for the first time with books, journals and data base producers for funds, is bad news for the primary publishers.

I feel, however, that since primary publishers publish the original material that indexing services guide readers to, good primary publishers have little to fear in the long run from on-line bibliographic files. But the golden days of the 1950s and early 1960s when primary publishers had library budgets to themselves and could sell almost anything they chose to produce have gone. Those happy days when any journal would at least cover costs and any symposium or monograph be bought automatically by some 2000 libraries always were something of a fool's market anyway—a transitory historical phenomenon.

The age of a new information medium is an exciting one. It offers new possibilities. But it is not cheap. I believe that, for the information users, if they wish to remain masters of the new information medium, they have either to work on a dramatic re-modelling of their budgets to embrace books, journals, indexes, terminals, PTT royalties and host computer payments or they have to keep their budgets for purchase of primary materials and let the new systems become established elsewhere within the company, university or organization. And I believe that too many data base producers, often encouraged by uninformed user groups or responding to the 'competition' offered by producers who are able to hide their considerable costs via grants and subsidies, do not at this dangerous initial stage show a long-term appreciation of the importance of what will need to be paid for using data bases in an on-line form.

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DISCUSSION

MR J. D. TURTON (Commonwealth Agricultural Bureau), hypothesized that in a few years' time there will be a very small number of on-line systems each with many data bases; the only thing that will differentiate systems being the quality of their data bases. Did Dr Cuadra agree with this hypothesis?

DR C. CUADRA basically agreed. He thought differences would be eroded, e.g. the response time of a system. With the improvement in the hardware even clumsy programs would be dealt with quickly. There will be competition among data base publishers to build better data bases in the first place. There will be improvement in the data bases themselves, in the way they are handled, in the equipment and in the quality of the service. Probably most significant, will be things that cannot even be imagined, and he quoted from the first volume of ARIST '. . . might be that we can forsee an individual sitting at a terminal, contacting a remote data base'.

T. MURPHY (The National Computing Centre): In view of Mr Collier's figures for usage, could Dr Cuadra give some idea of the usage of the various data bases and whether he thinks this will approach 150,000 hours in the next 5–10 years.

DR C. CUADRA could not envisage that kind of volume unless the price was cheap. The National Library of Medicine provided many hours by subsidizing the service. It is hard to see 150,000 hours at $80–90. Efforts to introduce on-line technology on a worldwide basis, e.g. Tymshare in South America, could make it possible to foresee that kind of usage.

G. TAYLOR (Offshore Abstracts): With reference to the search regarding cancer and saccharin where the cost of 4 references was given as 62 cents, what would have been the complete cost for getting the final search for the 36 references.

DR C. CUADRA: If the full print out was ordered with all codes, etc. this obviously would take longer (say twice as much for twice as much). However, if the operator has knowledge of the subject areas, than a knowledge of the codes could give you savings in time.

DR D. A. LEWIS (ICI) Plastics Division): A comment on Collier's paper—budgets will be balanced by reducing the salaries element. A comment and a question for Dr Cuadra—he was sorry to hear no mention of 'Standard Command Language'. What will be the likely social impact of universal access to vast databases?

DR C. CUADRA: If you stop now and look at command languages, you will freeze on-line technology and its development will be prematurely closed.

Commercially funded services—an appraisal from the viewpoint of the smaller user

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Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September, 1977

Introduction

MY BRIEF WAS to provide an appraisal of commercially funded services from the viewpoint of the smaller user, and to incorporate, if possible, some instant reaction to what the previous two speakers have had to say. I do not intend to turn this paper into a catalogue of what is available and what is wrong with it. There are many people far better qualified for that job than I and in any case it would take far too long. Rather, I hope to try to highlight some of the problems which come into play particularly in dealings between the small information unit and the external supplier. I hope to be able to suggest some ways of overcoming these problems to achieve a fuller exploitation of the information resource, to the benefit of the user, the supplier and, I believe, the nation as a whole.

To keep my remarks as relevant as possible to what has gone before, not to say to stick to an area where the holes in my knowledge are slightly less prolific, I intend to concentrate on commercially funded secondary services, regrettably to the neglect of primary journal and book publishing and its associated distribution channels.

As I have said, however, my viewpoint is not to be that of the large, sophisticated user who has been in the forefront of cooperative planning and development of these services, but rather that of the smaller, less sophisticated user who must often necessarily follow where others have led; albeit, perhaps reaping the fruits of their labours. In adopting this approach, I am very fortunate in that the view of the large sophisticated user has been very ably presented by Angela Haygarth Jackson, in a paper at the 50th ASLIB Annual Conference (1976) at Exeter entitled 'What the Large Users Expect from Secondary Services Producers'.[1]

Much of what Angela said obviously applies equally well to the small user as to the large. This is particularly true of what she had to say about the strengths and weaknesses of the data bases and other service characteristics which come into play once the user is actually attempting to use the service. For instance, if an index is difficult and cumbersome to use, or gives poor recall, it does not

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matter how big or small a user you are—it is equally bad for everyone. If coverage is patchy, if titles are not descriptive, the same applies.

So, in presenting my small, unsophisticated view of the situation, I would like to concentrate on the other end of the problem—the relationship between the supplier and the small user. I want to look at the factors which may encourage or inhibit the small user who wishes to make use of a commercially funded service; to look at how the service operators, and to some extent the users, might need to modify their approach to achieve the fullest exploitation of this resource.

The small user

If we are going to look at the problems which apply particularly in the case of the small user, the logical place to start is with the small user. If, therefore, we ask ourselves the next logical question—who are these small units?—how can we classify them?—what do they have in common?—we run straight into what I consider to be the heart of the problem. They have precious little in common! It is this very *heterogeneity* which makes them so difficult for the service supplier to deal with.

To illustrate what I mean, let us consider some of their characteristics. Firstly the subject areas with which they deal are scattered across the whole range of human knowledge. Even when we take a relatively narrow cross-section of units, in an attempt to find something in common—say those within the chemical industry—we still find a tremendous variation in the level of their interest and the depth to which they require the information to be organized. For example, the organization may have a relatively limited range of products but with applications in every industry under the sun. Conversely, like a pharmaceutical company, they may have a wide spectrum of products going into just one industry. They may, however, have a limited range of products with applications concentrated in one end-user industry, in which case they will require to have the information on these two areas organized in tremendous depth.

Secondly, the information required may be purely technical (even to the exclusion of patents because they are handled by a patents department). Information needs may be purely commercial/financial; or they may cover the whole spectrum.

The types of staff, and therefore the attitudes within the units, differ wildly. Units may be run primarily by young, highly qualified staff, crammed to the eyeballs with modern techniques of information handling, oozing with good ideas and revolutionary concepts. Or, they may be run (no less effectively perhaps) by someone who has been in the firm for twenty-five years plus, relying heavily on traditional methods and a wealth of personal contacts. The services these units offer may be full and comprehensive, active information services, or purely a conventional library where one goes to find books. The types of hardware used to operate their systems vary enormously; some small units are computerized to a considerable extent, but the great majority of small units are still working with manual systems, diverse and often peculiar, probably encompassing every variation of the card index that has yet seen the light of day.

Small units are often incarcerated in management structures as improbable and illogical as they are diverse, often having grown up solely to serve the parochial needs of one department. As a result of this, many units do, regrettably have one thing in common—they tend to be less well planned. If they do have a policy regarding their role in the organization, it is as like as not to be turned in the opposite direction by the next lot of management in the unending game of boardroom musical chairs. I seem to recall the remark made by one of the speakers about the low level of 'information awareness' in the underdeveloped countries—Ghana, I think it was. I could not help being reminded of some of the smaller units in this country.

If, by now, you are beginning to think that the picture I am painting looks incredibly black; that the small units are such a heterogeneous conglomeration of oddities that no one can make rational provision for them; that the prospects for planned, profitable, mutual exploitation by small users and secondary service suppliers look rather bleak, remember I have not considered the service supplier's problems yet!

However, let me pluck out a ray of hope. I have so far been talking purely about the information needs of the information unit, often parochial and peculiar through historical accident alone. What we should be considering, are the information needs of small organizations in which the small information units are immured. At this level, the needs of different organizations are very much more alike, very much more well-ordered and predictable. Moreover, when I look for some confirmation of this ray of hope, I find a similar recognition of the problem coming from precisely the direction we want—from the suppliers. Michael Sim, of ISI, in a paper to an IIS Northern and Scottish Branch seminar in 1974,[2] is reported as saying 'One cannot just try to give the user what he says he needs or wants'. The supplier's role must be 'to appreciate what the user thinks he needs and to succeed in supplying what he really does need'. When dealing with small users, suppliers must consider the needs of the whole organization; and it is up to us as users to try to represent the needs of the organization as a whole.

The service suppliers

Let me now turn to look at the service suppliers. What problems does the small user see. First of all—*complexity*. The vast range of commercially funded services currently available can be daunting to the small user merely by their sheer numbers and diversity. Add to this the problems of different indexing systems, different selection criteria, overlapping coverage, etc. and it is only surprising that the small user, with little time to devote to disentangling and finding his way through the maze, does not turn his back on the whole lot and go it alone. Even the great white hope, on-line, has different command languages; the data bases still retain their vastly different structures etc. In this context, I am very glad to hear Dr Cuadra say that the future should bring more in the way of aids to selecting databases and aids to term selection in controlled languages. I feel sure that the greater vertical integration he foresees between the data base supplier and on-line service supplier must be a good thing. Nevertheless, the smaller user is often tempted to ask the question 'Are we not developing too fast?' He often feels that if he jumps on the band-wagon and gears himself up to use the latest systems, in a few years' time he is likely to be facing problems of obsolescence.

Secondly, that ever-present problem, *cost*. For a variety of reasons, the smaller user is often left with the feeling that the results he gets from an external service do not give him value for money. Logically, this should be nonsense, but unfortunately a number of factors, some connected with the service, some with the user, and some with the organization for which the user works, often combine to make it so. In other words, the smaller user's use of external services is often grossly inefficient. The above two problems are compounded by the problem that exists in any large supplier/small customer relationship; a lack of communication and mutual understanding.

You will be glad to know that I have now reached the nadir—the depths of my picture of gloom and despond. At this point, you may be wondering whether the secondary service suppliers are justified in concentrating their efforts on the big-boys and leaving the little user to fend for himself.

It is now time to look on the positive side—having identified plenty of problems, to look for some solutions. *First and foremost is the question of the potential of the small user as a market for the service suppliers.* I firmly believe that the potential of this market is as yet relatively untapped. It has been said (for instance by D. H. Barlow of INSPEC[3]) that UK abstracting and indexing services are facing a common problem of market decline; and in terms of the cuts that have been seen in library and information budgets, he is perfectly correct! But this should not be so. We are supposed to be entering the era of 'The Information Society'. In many small organizations information awareness is still vastly under-developed. If this is not a market with growth potential, then nothing is! I would suggest that the problem is one of failure of communication between the service suppliers and the end users—and by end users I mean the user organizations as a whole, not just the information unit sandwiched in between.

The secondary service producers have strengths which will be vital to any organization in the 'Information Society'. Gone are the days (as Angela Haygarth Jackson said[1]) when even small information units can hope to do everything in-house. They have to buy services in. The external service supplier can offer tremendous advantages. First of all, a cost advantage deriving from the economies of scale. Secondly, external services can offer a breadth of coverage which could never be contemplated by the independent unit; and this is even more true, now that we have the great white hope. I fully agree with Dr Cuadra's suggestion that on-line can be an equalizer between the haves and have nots.

The commercial suppliers must take up the challenge. It is up to them to develop this market for the benefit of the user, the supplier and the nation as a whole. Now how do we go about it?

I have three headings under which I wish to consider the way forward; the changes in approach that may be necessary.

1. Flexibility

All too often the small user is thwarted in his attempts to get the information he needs by a lack of flexibility in the service which could provide it. He often finds that the information he wants is contained in a huge monolithic data base which is only available with a huge monolithic price-tag—even though he only wants a small part of it. With such an arrangement, a threshold effect operates. Below a certain level of usefulness or above a certain price it is not worth while for an organization to pay out thousands of pounds to buy the data base just to get the part it needs. As inflation takes prices up, users are constantly dropping below the threshold. The subscription is cancelled and the whole revenue is lost, lock, stock and barrel. In many cases, suppliers could counter this problem by making available smaller slices of the data base. With computer techniques these slices could be tailored fairly closely to the user's needs. UKCIS, encouragingly, are beginning to adopt this approach—sitting down with users to attempt to define the smaller packages that would fit these users' needs; and then to find a way to provide them. From what Harry Collier has said, finding some intermediate source of revenue as an alternative to the all-or-nothing situation is going to be vital during the advent of on-line. On-line itself can give this flexibility in that it affords 'pay-as-you-use' facilities—but excepting cases where full text abstracts are included, the user often wants to have hard copy available to make relevance judgments before ordering papers, or, given good abstracts, instead of ordering papers. Service suppliers should not underestimate the value of abstracts. The new CA SELECTS current awareness services being introduced by UKCIS should demonstrate this. Suppliers must appreciate that the total process of filling information needs involves far more than using indexes to retrieve bibliographic references.

Another problem that often stands in the way of the small user getting what he wants is that, not surprisingly, the data base is not indexed from the user's own point of view. In some cases the indexing may be from the right angle, but not deep enough. In other cases, the indexing may be from the wrong point of view, especially when the user is not in the same industry as the one being covered by the abstracting service. The important point is that the supplier must realize that users often need to supplement the indexing in their products, and they must plan for it. Peter Vickers made an interesting point about this at the 50th ASLIB Annual Conference when he wondered whether we could have local data base enhancement services.[4] If I understand him correctly, these services would not only strip off from the big data bases the few items a small user required, they would add index terms so that a user in a fringe field could retrieve them from his point of view. One might even find that in many cases the profiles required to do the stripping might already have been developed by the user for SDI purposes.

To summarize this requirement for flexibility; to cater for the smaller user, suppliers must cease to think of their services as huge, monolithic lumps. They must look rather at the data they contain and at the use that can be made of it. Then they must find some way of allowing and encouraging this use to be made. The problems I believe are largely only those of marketing strategy and pricing policy; how to reap the revenue from a flexible service without losing that from the monolithic lumps that no one wants anymore. To move into the 'Information Society' we will need all the quick thinking we can muster to keep up with change. Let us not put barriers in the way of change, especially in the case of small users who are still evolving their information requirements.

2. *Partnership*

The second concept I would like to see developed is that of partnership. I have recognized that it is difficult for a large supplier to maintain anything more than perfunctory contact with small users. I also recognize that a tremendous amount of work is done in this area, through users' advisory groups and liaison meetings. But every bit of contact is vital. The effort put into training and education of users has increased in leaps and bounds since the advent of on-line. In dipping my own feet into the on-line pond, I have been impressed by the amount of help and the guidance available. Again, we can use every bit of help we can get to train us to realize the full potential of the available service—to everyone's benefit. Nevertheless, there are unfortunately some ways in which the suppliers' interaction with user organizations can be counter-productive. Here I am referring to situations which can arise when suppliers deal with people within an organization whose primary responsibility is nothing to do with library or information services. There are many and good reasons why contacts of this nature arise, particularly within organizations whose information functions are underdeveloped or otherwise limited (for instance to technical information within a research department), but in such cases there are many factors which will weigh heavily against the continued provision of a successful service. In this sort of situation, with a few exceptions, it is highly unlikely that the organization will be getting all it could from the service. The person receiving it may well be considering only his own personal needs, or at best those of his department. The non-information contact is unlikely to have time to acquire, let alone maintain the expertise required to exploit the service fully. Moreover, as people change jobs, it is highly unlikely that a successor will take the same view and display the same attitudes. In this case, the supplier has no right to be surprised when the service is cancelled—a cancellation that may take some years to reverse.

I am firmly of the opinion that it is in the supplier's interest to deal with an organization through channels which display a stable policy and get good results from the service. Although this may sound horribly biased, to my mind this is synonymous with dealing through a department whose role it is to look after the information needs of the organization. The supplier should do everything in his power to bring this about. This is what I mean by partnership. The supplier must be very careful in his dealings with non-information contacts. If he over-publicizes, over-sells or over-rates his products, he can create tremendous barriers to future use; and suppliers, paradoxically, often have easier access to high-level contacts than some small information units. They must not abuse this contact.

There are, however, many instances when the level of potential use of the service by an organization does not warrant direct contact with the supplier. To draw an analogy—in industry, small customers often deal with distributors or agents rather than the large manufacturers. So we have a parallel in the information world. These intermediaries taken the form of professional bodies, learned societies, trade associations, nay, even ASLIB itself. For many years such organizations, have provided users with selective specialized sources of information or with the expertise they need to obtain it. Long may they flourish. Now they are installing terminals to tap for us the potential of the great white hope. I wonder, is this to be the pattern of the future, or merely the means to an end. Is it not likely that small users dealing through intermediaries might only be an educational phase; educating both the organization and the information units who are intermediaries within the organization.

3. Integration

Finally, the third heading. I believe in the teachings of an equation:

$$\begin{array}{l}\text{the chance of using a source}\\ \text{and therefore retrieving a}\\ \text{specific item}\end{array} \propto \begin{array}{l}\text{potential}\\ \text{benefit}\end{array} \times \begin{array}{l}\text{probability}\\ \text{of a hit}\end{array} \times \frac{1}{\text{difficulty factor}}$$

This equation seems to have something to say in many practical situations in information work. To illustrate the particular point I have in mind, let us consider the case of an information worker searching for a specific item of information. In today's real world, pressures on his time will inevitably force him to strike a compromise, consulting only some of the many sources potentially available to him. I would suggest that his choice of the sources to use is governed, consciously or unconsciously, by this equation. If we want to improve his chances of using the right source we must find some way of increasing one or more of the factors on the right-hand side of the equation.

We have, in fact, already discussed ways of reducing the 'difficulty factor' by better indexing, removing artificial pricing barriers etc. However, there is another factor we can influence. To increase the 'probability of a hit' you merely increase the coverage of the source i.e. reduce the number of sources. This is merely a very elaborate way of saying that it is better to have fewer places to look! I suppose the ideal would be one single, all-embracing source which would guarantee to give the answer to everything.

On-line terminals go a long way towards this utopia. They provide an enormous range of sources at one's finger tips, and despite what we might say about the 'difficulty factors', the multiplicity of command languages and data base structures, the barriers to use are really very low. However, not all sources are best interrogated on-line; and some will never be. Not even in the days of the great white hope will we be able to rely totally on external services. We will still generate much of our information internally. Nor would many small users want to rely on external services. They have internal systems which handle information very well; they merely want an easy way of integrating the external information with their own internal system. We must, therefore, look for methods of integrating sources in this way.

The big boys, of course, are able to strip data bases onto their own in-house computer systems and even interrogate these on-line, in-house if they wish. But what of we who have not even got a computer? Should we not, for instance, have the flexibility to incorporate external service output into our good old card systems; and so on up the scale? The suppliers must think about what the smaller user has to do with the output of their services to integrate it with his own system. Perhaps our latest technological ally, the mini-computer, will have something to offer the smaller user. It might mean that he no longer has to bear the nonsensical frustration of being obliged to receive the output from computer-based external services in non-machine readable form. But this can only happen if the service suppliers can have the flexibility to provide the user with his material in whatever form is best suited to his needs. I am convinced that we have the technological capability; it is up to the suppliers to evolve their marketing strategies and pricing policies to allow us to exploit this potential.

Conclusion

The suppliers must plan for flexibility. They must try to give the user what he needs, not just adopt a 'take it or leave it' approach. The suppliers must consider how the user organization will want to handle the data when it has received it. The total information transfer process does not begin and end with the use of indexes to retrieve bibliographic references. Thirdly, there must be a joint effort to develop, within smaller organizations, an awareness of the organization's total information need and a stable policy to provide for it. The users themselves must do a lot of this, but commercial suppliers can help and in fact many other organizations have a part to play—the intermediaries, professional bodies and government. Perhaps the conclusions of this conference will show us how this can best be done.

The smaller user, on the one hand is extremely fortunate to have available the range of services that he has. In this sense, he is truly reaping the rewards from the seeds sown by larger users. On-line will be a boon to the smaller user; potentially a leveller between the haves and have-nots. However, unless we are very careful, it may be a case of so near and yet so far. If we are to close this gap, and the small user is to be able fully to exploit the resources available, flexibility, partnership and planning for integration must be key features of the suppliers' approach.

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DISCUSSION

MR WALL (Loughborough University of Technology): Some points of John Pickup's paper are reminiscent of difficulties we had several years ago with a project of Interdisciplinary Information Studies. The aim was to test the feasibility and assess the problem of stability and merging subset tapes from main data bases in order to form an interdisciplinary file. In fact, we had difficulty in obtaining tapes as an alternative to SDI printout and had to conduct the project with only three specimen tapes, simulating other relevant activities. Have you any comments on this please?

MR J. PICKUP: That is precisely the problem and I do not know the answer. The small user cannot do the work on establishing merged sub-set tapes. The problem is not one of technology, more a question of pricing policy.

MR H. COLLIER: There are two organizations who supply subset tapes. *Referativny Zhurnal* supply 147 subset tapes in any combination. This is a user's dream, but a data base supplier's nightmare. The problem is economics if you have a lot of small sets with all your users having slightly different requirements.

DR C. CUADRA: Subsets are very costly. At the moment *Chemical Abstracts*, say, send a tape, this is processed, checked, etc., converted, indexed, tested again and then merged. If you want, say, three tapes then its three times the effort and storage becomes a problem as well. The trouble is that it seems that the service can be broken up into neat boxes, but this isn't true, there is a lot of overlap and a user may be asked to search other subset tapes.

MR R. WALL. This is all interesting and informative, but not quite what I meant. I was not referring to standard subsets, but to tape supplied as an alternative to SDI print out, in accordance with an individual profile. In the absence of subset tapes, one would have to rekey—a costly move.

MR P. JUDGE (CSIRO) (*à propos* Collier's answer to Wall's question): Surely the computer can provide the accountancy capability to handle all the subsets you need at low cost. If these subsets are not available, it is because the data base producers are studying their own convenience before that of their customer, and cutting themselves off from a potential market.

MR J. D. TURTON (CAB): Some large data bases are already broken down into subfiles. For instance there are 22 subfiles in the CAB data base, corresponding to the various abstract journals and subject areas, such as nutrition. Such data bases already offer logical separation. Some speakers have been talking of physical separation into subfiles, i.e. tape-based searching. This type of searching is surely something we have now gone beyond.

MR B. STERN (Excerpta Medica): 1. Subsets of data bases have been available in weekly or monthly magnetic tape in medicine since 1968. 2. Data base suppliers are showing an act of faith in not receiving sufficient revenues for machine-readable versions (on-line, off-line, etc.) to cover the costs of replacing the old computers and software, yet making such investments hoping user demand will grow sufficiently. 3. A committee has been formed to meet and advise EEC on the impact of on-line on journal subscriptions. The committee consists of the larger American and European data bases. So far there appears not to be any significant erosion of the subscription, but if the expected increase in on-line takes place and smaller organizations in particular begin to cancel subscriptions, database suppliers will go out of existence, as the 90 per cent plus of subscription income decreases, unless a different revenue strategy is found.

DR. C. CUADRA: The point about on-line data bases is that they are tools which are infinitely sliceable into subsets and are available to be sliced when and how they choose.

MR R. WALL: In view of some continued misunderstanding, I shall have to give a little more detail. From about 1972 to 1975 we had a project involving a model interdisciplinary area—Particle Science and Technology—and during that time were only able to persuade three data base producers to supply us with specimens to our profile. Placing oneself in the shoes of a worker in Particle Science and Technology, he would need to consult or use on- or off-line, *all* the Sci-Tech databases, which number more than 100. He could not possibly afford this for specific enquiries, let alone SDI. A solution therefore would seem to be the build up at an academic centre of excellence, perhaps, of an interdisciplinary data base formed of subjects from the major bases, and provide a service from that. At present I believe the data base producers are still not sufficiently flexible in policy to allow such interdisciplinary services to be set up in the way outlined.

MR H. COLLIER: With regard to SDI profiles on tape—ISI does it and have always done it.

MR J. PICKUP: Is it possible for large data bases to supply cassettes for me to do my own search on my small computer?

MR H. COLLIER: You can get a tape, take it to a service bureau and have it repackaged.

Leslie Patrick Memorial Lecture

Introductory remarks by the Chairman, D. Mason, College of Librarianship, Wales

Leslie George Patrick

During his working life, Leslie George Patrick was closely connected with Aslib. He served on its Council and Committees for 23 years, and was Chairman of Council from 1963 to 1967. He was also UK representative to the Developing Countries Committee of the Federation International de Documentation, and in 1972 presented a preliminary report on UK aid to information services in developing countries. His career in librarianship began at the University College, London, where he moved to the Wellcome Historical Medical Museum. In 1934 he became librarian of the British Non-ferrous Metals Research Association, where he required a well-deserved reputation in the field of metallurgical information. From 1951 to 1966 he was librarian of Aluminium Laboratories Limited, after which he joined the teaching staff of the College of Librarianship Wales, becoming Principal Lecturer in Special Librarianship. His other professional activities included service on the Executive Committee of the National Central Library for nine years, and as an examiner for the Library Association from 1948 until his death in 1973. To remember Leslie's services to the information profession, a Trust fund has been set up and the Trustees decided to arrange a biennial memorial lecture.

Leslie was a deeply religious man and a Methodist lay preacher. His concern and help for students and for members of staff will be long remembered and I feel that he would have been particularly pleased to know that the first lecture to honour his memory is being given by Colin Offor, who was one of his personal students.

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Changing patterns of information use and supply

Colin Offor

Warwick Statistics Service, University of Warwick

Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September, 1977

Introduction

THIS IS NOT the occasion for a eulogy for Leslie Patrick, but since it is the first of the series of lectures commemorating his contribution to this profession, I cannot let the occasion pass without expressing my view that this is a most appropriate form of memorial for someone, who in all of the years of service he gave to Aslib, to his employers and to his students, never looked for any special recognition. I knew Leslie as a teacher; one who took his enthusiasm for the practice of information work so naturally that it automatically transferred itself to those of us who studied with him, and one whose support and encouragement lasted well into our professional lives, and indeed until his death. It would give him great satisfaction and delight to know that many of his students are now reaching positions from which they can repay the profession for the effort he invested in them.

I know nothing from personal experience of his work for Aslib, or his contribution to the libraries in which he worked, but it is a tribute to his personal and professional qualities that many of his former colleagues have contacted me to express their satisfaction that his achievements will not go unrecognized. Few of us ever have the opportunity publicly to acknowledge the debt we owe of our teachers, so may I thank Don Mason and his committee on behalf of all of Leslie's former colleagues and pupils for establishing such a fitting memorial, and on my own behalf for giving me the privilege of participating in honouring the memory of Leslie Patrick.

If I may quote, slightly out of context, Sir Geoffrey Vickers in his book *Freedom in a Rocking Boat: changing values in an unstable society*[1] I may be able to encapsulate my theme for this lecture. His concern is with the effects on society of changing and conflicting attitudes to rapid development in all aspects of life. In discussing technological development and our reaction to it he says 'If we can decide upon our priorities, we can use our new machines rather than be used by them.' It is with our priorities in the changing context in which we are working that I want to deal. It will be impossible in any review of the effects of the changing nature of the use and supply of information to ignore the influence of the new technology with which we work, but too many augurers have already portrayed the mechanic's vision of our future, that is, one determined by the capabilities of our equipment rather than by the demands of our situation. My concern here will be to review the changing nature of the broad community and of the specific environment in which information work as we understand it is being practised. It is also to examine some of the responses to the challenge of these changes. It would be wildly optimistic, not to say presumptuous, to hope then to arrive at a set of priorities to guide the future development of our activities, but I do hope to be able to isolate at least some of the factors which will need to be taken into account.

The concept of information work

'Information work as we understand it' is not a straightforward concept to work with, for implied in much of this paper will be the thought that we tend to confine ourselves to a concept of information work which, if not wrong, is at least too limited. The picture is further complicated by the fact that, while we never have sole rights to the term 'information', many operators are now using it as a cloak of intellectual respectability. Only recently an encyclopaedia salesman on my doorstep opened his sales pitch by asking if I would be prepared to help him with his research on 'an information system in the field of education'. However, there are many legitimate claimants to be branches of the information profession. Danial Bell's *Coming of the Post-Industrial Society*[2] has given this concept considerable academic support. In a recent interview in the journal *International Management* Professor Bell says, 'For me, the chief characteristic of the Post-Industrial society is the emphasis on information and knowledge.' He indicated that his studies had shown that more than half of the U.S. Gross National Product is generated in the information sector. He goes on, 'If that sounds a high figure, remember that much of manufacturing today is essentially information processing—programming, scheduling, quality control, marketing. Even a large part of agriculture is involved in information processing—crop recording, scientific work, marketing.'[3]

We all know as an example of this that public relations men often style themselves—and justifiably so—information officers. At this level all we would seem to have to worry about is a more specific label to define us and what we do. On deeper consideration, however, it leads us to examine just what is the body of theory, the set of activities or the group of people we want to become attached to that new label. I shall return later to considerations of our role and future in relation to this broader information community, but I have introduced the idea here so that we can proceed with an agreed definition—albeit oversimplified—of 'our kind of information work.'

Writing in the third edition of the Aslib *Handbook of Special Librarianship and Information Work*, J. E. Wright describes it quite succinctly. '... the information officer may go so far as to interpret for the technical staff of his parent organization the information contained in the literature; he may say with authority how a problem should be tackled. This is, however, exceptional, for most information officers are in no position to go further than provide references to the literature relating to a technical matter.'[4] Times have certainly changed since that was written in 1967, and there is considerably more emphasis now on the evaluation and analysis of the content of the literature than there was then, but what sets us apart from other information workers is our concern with information as it appears in the literature, whether it be in textbooks, newspapers, market research reports, computer print-out or learned journals. Our position as middlemen has arisen out of our origins in librarianship, and is of itself no bad thing. But like all retailers who hope to be successful, we must examine the structure of the market in which we operate. In the early 1960s, power in the consumer goods markets shifted to the retailer, when a few astute organizations came to recognize that by organizing their outlets in a particular way and on a particular scale they could not only satisfy consumer demand, but also demand products, prices and margins from manufacturers/wholesalers. In the 1970s consumers have begun to understand, and use, their power in the marketplace to become the dominant force. Which is as it should be.

In the information business we are still in the primitive, supplier-dominated situation. From the universe of available literature, we acquire that which we think will be relevant to our client's immediate or potential needs. We supply it on standing order or demand. Certainly we do some market research, but this is mainly to establish our own effectiveness in carrying out our retail function in relation to the existing pool of literature. It has rarely been used to develop new products, or own brand versions of existing products, or to show up gaps in the market. If we are to reach the ideal of a demand-dominated market place as quickly as possible, we must understand something of the changing priorities of our users, trends in the supply of information at all levels of packaging and analysis, and developments in our own professional activity. More than that, we must understand the existing and potential interrelationships if we hope actively to shape our own professional future.

The user

Let me start by examining our users, who they are, and what they demand of us. Ultimately, as a profession we serve the community at large. Perhaps at this stage I ought to say that I am confining my examination to the United Kingdom situation, and that my remarks may only be applicable in other countries at a similar stage of economic and social development. We serve the community in the sense that 'this relatively wealthy society is increasingly dependent on an efficient infrastructure.'[5] If we see ourselves and our activities as having any importance at all, we must concern ourselves with the total success of the organizations in which we operate in contributing to the general economic good. This is not a time-specific responsibility, our current economic difficulties just bring it more forcibly to our attention. If we fail in that responsibility one of two things will happen. Either they will get by without us by having someone else take on the job we have shirked, or more probably our employers will function that little bit less efficiently with consequent cumulative waste of resources.

The role of information services

In a very thoughtful paper on the role of information services recently presented at the Joint Aslib Midlands and Northern Branch Conference, John McLachlan, Managing Director of *Who Owns Whom,* reflected on a fact of life than despite the availability of information in relatively low-cost secondary sources, there is 'sometimes too great an inclination on the part of research managers to leap straight into primary research—usually because the client commissioning the work expects it. This undervaluing of the part to be played by bibliographical research and other tools of modern information science may in effect derive from a general undervaluation and consequent under-utilization of librarians and information officers in British commerce and industry.'[6]

Our responsibility to the community at large in this instance rests in actively preventing such waste not by 'educating our masters' but by placing ourselves organizationally in the way of an alternative approach. '. . . primary research . . . conventionally at least, is too often assumed to be outside the terms of reference of a company's own information officers—and in my experience this assumption tends to be made far too readily by the information officers themselves. ... There is of course no logical reason why the simplest working definition of *information officer* should continue to be "one who gathers specified information by means of bibliographic research". It might even be asked whether a job profile related to work with secondary sources alone can reasonably be equated with the title *information officer* which surely implies more.'[7]

Now this example is drawn from, and probably specific to, commercial information, but the application of the principle of concern for the organization's overall efficiency in its use of information is not.

Changes that affect users

In the light of this overall responsibility, let us look at the changes that affect our users—and may have altered both who they are and what they might demand of us. I would like to highlight three major changes:

(i) the growing importance of services in our economy,
(ii) the shift from product to market orientation in all branches of economic activity,
(iii) the increasing complexity of the environment, some might call it a minefield, in which commercial organizations in particular operate.

Services

It can hardly be contested that services are playing an increasingly important part in our economic life. Taking as a simple measure the contribution of services to the Gross Domestic Product, this has increased from 40 per cent in 1965 to 50 per cent in 1975,[8] and this ignores the contribution of service elements in manufacturing, agriculture etc. As a service ourselves we have acquired new clients out of this development. Of course some services have a long tradition, if not of information departments, at least of good special libraries—banks, insurance companies and lawyers for example. Not so traditional are the excellent information departments now to be found in advertising agencies, market research bureaux, management consultancies, tourist organizations, retail stores, shipping brokers and so on. Service departments and bureaucracies of organizations are increasingly demanding the same kind of support traditionally provided to research and technical staff.

The essential difference between the information requirements of such organizations and those of manufacturing or research establishments is that the information emphasis is not on the client's specialist subject field, but on that of the client's clients. Thus the subject knowledge requirements of information officers in these circumstances is one of breadth rather than depth. The problems caused by the literature available in these fields are less fundamental in this context than the way in which the information problem arises, and the expectation of the client when approaching an information service.

If I may digress for a moment to relate an anecdote from the *Financial Times* 'Men and Matters' column earlier this year, it may illustrate something of the difficulty—or not, depending on your point of view. A French balloonist crossed the channel and landed in an isolated field. When he asked a passing stranger where he was, he was told, 'You're in a wicker basket in a field' to which the Frenchman replied, 'You're an accountant aren't you?' Stranger: 'How do you know?' Frenchman: 'Your information is typical of an accountant, accurate but useless'.

Now it is no doubt true that there are immense problems of reliability, availability, price and bibliographic control in the literature of markets, for example, but these can be sorted out if those concerned are prepared to grasp the nettle, and apply consumer pressure. What cannot be changed, and indeed what we should not want to change, is the untraditional nature of the information requirement—the demand for soft data, for opinion, and for at least a certain amount of analysis of the documented information, either to relate it to the problem in hand or to stimulate the synthesis of ideas. That is not to say that such clients are unsophisticated information users. In fact I have known several marketing consultants who would have made brilliant information officers. But then few information officers earn £150 per day. It is in the nature of the job that services are required to do, their relationship to their clients, and the type of personnel involved that the challenges to our profession arise.

The shift from product to market orientation

The orientation of industry towards markets rather than manufacturing capability in planning has had a similar influence on those required to support planning activity with information. By this I mean the tendency to make what one can sell, rather than to attempt to sell what one can make. May I quote a definition first before telling you what the definition is of? 'A structured, interacting complex of persons, machines and procedures designed to generate an orderly flow of pertinent information collected from both intra- and extra-firm sources, for use as the basis for decision making in specified responsibility areas of marketing management.'[8] Is it a definition of the ideal information service for a marketing department? As it happens it is a definition devised by two marketing executives for Marketing Information Systems—'not our kind of information' do I hear? Yet if we are not devising and organizing such systems, what role are we left with in the context of such a comprehensive set-up? The emphasis of our activities on documented information means that we can only be a service part of such a complex. And if we are happy with that role, why are not the real policy makers sitting here among us discussing the future of what is more genuinely their profession than ours?

It will be obvious that these developments affect the commercial side of enterprise, and that research and development, and the information departments which service them, are only affected in so far as they are part of the infrastructure of organizations subject to commercial and market pressures. On the other hand, it could be said that they exemplify a situation which is already developing in the scientific and technical information community. With the increasing use of data bases and mechanized bibliographic searching, the intellectual activity in the information transfer process is increasingly required at the input end with data base compilers and systems designers, and at the user end with those who will analyse the information and initiate any necessary response.

These, and associated trends, have led one thinker in the field, Den Lewis, to put forward what he calls his Doomsday Scenario—in 'There won't be an information profession by A.D. 2000.[10] His examination of current trends has led him to the conclusion that '. . . in the year 2000, with a world-wide communications network available which will provide universal rapid access to the substantial majority of required knowledge, the information scientist will have gone the way of the brontosaurus'. The best we can do, apparently, is to get the best systems in as we phase ourselves out. As I understand it, what he is saying is that the information profession, if it then sees itself as having a corporate professional identity, will be composed of people with radically different skills, doing a radically different job, and at a different stage in the communication process.

The only possible flaw in the argument is that such universal systems will not cope with the synthesizing of local and environmental information with the output of the network, and integrating the result with the user organization. The Marketing Information System defined above is ideally suited to perform just that task at the user end.

The complexity of the environment

You will no doubt have noticed that the pressures for changes I have so far identified are by no means mutually exclusive. There are, however, sufficiently separate elements to make it worth separating them in trying to understand the factors likely to affect our future. The last such development I want to discuss here certainly has elements of the two previous ones within it. It is the increasing complication, some might say hostility, of the environment in which all organizations, but commercial ones in particular, now operate. Scientific, technical, marketing and competitive developments we are used to monitoring. But who is giving advanced warning of potentially harmful legislation, of changing social and consumer attitudes, of impending industrial relations difficulties and so on. It is said of Harold Geneen, first president of ITT, that his favourite business maxim was, 'I must never be surprised'. Quite a challenge to any company information system.

This need to be warned of developments in an organization's operating environment has led to the concept of corporate intelligence. A Stanford Research Institute report in 1971 summed it up quite neatly. 'How does a company management keep track of what it ought to know about what is going on in the world, and get the information to the person who needs it.'[11] Now it cannot be denied that very often the term corporate intelligence unit is used to refer to the head office library, but such misuses of the phrase does not invalidate the concept that there must be some organized solution to the problem that '... managers are often inundated with data they cannot use, while lacking essential information'.[12] Again, if from the body of this profession we cannot provide the skills and imagination to devise and manage the necessary systems, then we are more than likely to find ourselves either redundant or just one library-style element in a grander scheme of things, not of our making.

The development of an effective corporate intelligence model will, I suspect, be a long time in coming, since there is not yet a clear understanding of the decision-making process and how information need is recognized within it. Nor do we understand enough of the dynamics of organizations to be able to instigate networks which do not intefere with the natural information flow within them. A frequent response to the suggestion that a totally integrated information department, coordinating all of a company's monitoring of its activities and environment, might develop, has been that it would create a concentration of power which would never be tolerated.

Developments in the supply of information

To discuss developments in the supply of information is a more complex problem. Anyone involved at any stage of any communication process is an information supplier in some sense. I will leave until the end our own position as suppliers of information, and try to isolate just some of the major developments which affect that pool of documented information which we currently recognize as being our responsibility to access on behalf of our users. There can be no doubt that the most publicized development has been the growth in the volume of organized information, closely followed by the emergence of data bases and data base networks. Perhaps a more fundamental change has been an ever-growing tendency to regard information as a commodity. The final factor is not so much a change in itself, but an unresolved conflict of interests arising from new commercial priorities. It is the conflict between the social and economic necessity for the diffusion of innovation, and the commercial necessity to protect competitive advantage.

The growth in the volume of information

So much has already been said and written about the so-called literature explosion, that there seems little point in discussing it here in detail. It might be instructive, however, in view of our concern for the interreaction of users with information to examine the reactions of one such user. Writing in a recent *Financial Times*, Harold Lind says: 'C. P. Scott's old dictum that facts are sacred has taken on a new meaning as computers swallow, manipulate and regurgitate mountains of statistics. But one suspects that the worshippers of facts, like many acolytes before them, prefer not to think too deeply about the objects of their veneration. The problem with facts is that there are so many of them, and that they are often so difficult to grasp.... I feel as Aladdin must have done when landed in the treasure cave. Surrounded by wealth, one's sense of discrimination stops working, and it becomes impossible to select the strictly limited areas which is all that time permits. In addition, there is the feeling that somewhere among all those facts is the equivalent of the magic lamp, which, if you can only spot it, is more valuable than all the rest put together.'[13] Could it be that our response to the volume of data is to become the searchers for magic lamps?

Data bases and networks

I have already discussed something of the effect that the growth of data bases and data base networks and other on-line services might have on our professional future. But this will not happen unless the use of such advanced technology is diffused throughout the information world, and unless they are used as genuine replacements for existing inadequate resources or methods. The opportunities for the Luddites among us to relish the inadequacies of search strategy potential flexibility, coverage, and output are many. How often have we heard 'Yes, but I want data on line, not references', or '. . . very impressive, but it doesn't fit in with the way we work' and so on? Users of such systems in the large research establishments, who quite naturally lead in the adoption of such innovations, might be surprised at the sceptical reaction of their more numerous colleagues in smaller establishments.

It is in recognizing that we must specify what we need from the sophisticated technology, and insisting on getting it either by consumer pressure or co-operative effort that we will ensure that the advantages are available to as wide as possible a sector of the information business.

Information as a commodity

The growing concept of information as a commodity has taken a number of forms, some of which we could well do without. The expensive repackaging of information which is relatively cheaply available in secondary sources is one which is particularly familiar in the marketing field. However, the growing recognition of the cost of turning data into information should work to our long-term advantage. It may well be that the sources of information which we use will become increasingly expensive, at which point our ability to assess relative values and to ensure maximum utilization will become more and more important. One small, but significant response has already been the attempt to sell access to any spare capacity in information departments on a short-term marginal-cost recovery basis. The Times Marketing Intelligence Unit and Tyton Information Services are perhaps two of the most publicized examples.

A development which has some curious implications is the growth of the Information Broker. Since the appearance of Dodd's article in *Special Libraries*,[14] there has been some controversy about what should be the attitude of conventional information officers. The information broker, having no basis of stock of his own, sells his expertise, usually on a freelance basis, as a user of libraries and information services on behalf of those who do not have the time, the knowledge or the inclination to use them directly. As I understand it, the objection is that by using 'free' library facilities they are making a profit out of interposing themselves between library and potential user. Also, by taking advantage of the generous nature of librarians in opening their doors to genuine researchers, without being able to repay the compliment, they are undermining the spirit of inter-library cooperation. Clearly though, the complex nature of information searching must make such individuals a godsend to small companies. We are at some stage going to need to resolve the conflicts of interest involved.

Perhaps the most encouraging response to the commodity view of information, as been the recognition that our own internal users must be treated like customers. The product must be attractively packaged and its use made desirable. Before I discuss our own position as suppliers, however, I must briefly refer to the dilemma facing those at the forefront of technical innovation.

The protection of the patent laws has encouraged virtually unrestricted publication of developments and discoveries in science and technology. This has pleased the researcher who quite properly sees his work as being for the long-term benefit of mankind, but who probably has little patience with those who would place restrictions for commercial, competitive reasons. It might be said that it is for the good of the community as a whole that innovation is diffused as widely as possible, but this is a political consideration outside our professional control. It affects us, however, in the sense that there is an increasing tendency to be guarded about competitive development, and what information some years ago would have been simply available in the literature, can now only be discovered by synthesizing two or more separately published and perhaps apparently unrelated items of information.

Responses to change

Now let me quickly review the major responses which are required of us by these changes. I should say that some of these are beginning to be implemented by many of the more adventurous among us. I hope that by enumerating them I will indicate factors which must be taken into account in working towards a set of priorities for future planning.

We are at some point going to have to decide on what kind of relationship we want to have with other branches of the information community, particularly those involved in the same communication networks as ourselves. At one end of the spectrum this means the systems designers, be they designers of in-house MIS type systems, or of large scale data banks and networks. At the other it means analysts, planners and others who process the information we provide but are not themselves the ultimate users of it. Do we try to join them? Do we train our successors to move into these areas of activity, and if so have we genuinely eradicated our original function, or left a gap for someone else to fill? Or do we have them join us? Should such people be joining us in organizations such as Aslib, working with us to plan together the information services of tomorrow?

Looking at a possible future in which bibliographic research has become an almost clerical operation, is there still a role for an intermediary between system and end user? The response so far has been that there is, especially in relating those data which have no apparent connections with each other, or value to the client organization. There would also seem to be a continuing need for the presentation of information as a stimulus in such a way that there has to be an active response—be it positive or negative. Also, there has to be someone acting on the consumer's behalf ensuring that the system operates to the best possible advantage of the organization.

Have we any business involving ourselves in what might be called 'live' data? At a recent joint Aslib Midlands and Northern Branch Conference, an exercise in business decision making was staged to give delegates some kind of understanding of the way in which information problems arise. The problem chosen was a company relocation exercise. What surprised me, and I know many of the other participants was that, of the large volume of information concerning virtually all aspects of the company's organization and operation, little if any of the vital data would or could have been supplied by a conventional information service. Information on transport costs, distribution costs and networks, relative labour costs, health and safety considerations, sales distribution patterns and plant costs were readily available within the firm. In how many real life situations would these have been deposited in a library, or would the information officer have had responsibility for their compilation, administration or control?

It has been suggested that intelligence work is the next logical step in the development that has brought us from passive libraries to active information services. No definition has yet gained general acceptance, and in many instances the title has been applied to activities which good information departments have been doing for years. It is possible, however, to isolate some activities which are genuinely different. Examples are: taking responsibility for scanning the total operational environment; the origination of primary research to fill gaps in the documented information; the preparedness to take responsibility for the information as passed to the user; the authority to initiate certain levels of action in relation to information received; the responsibility for carrying any particular item of information to the appropriate individual and the presentation of it in such a way as to ensure a response, and the responsibility for the network by which an organization receives and absorbs operating information from its executives.

Finally, how will we respond to our responsibility to society, not as efficient servants of its economic units, but as a profession? Aslib and other professional bodies have done splendid work in the past in representing the views of their members to Government over proposed legislation which might affect our work. But more than that, do we not have a duty to decide what the country needs by way of an effective policy on information, and actively to campaign to ensure its adoption?

Conclusion

In conclusion may I return to John McLachalan's paper from which I quoted earlier. He ends by saying '. . . now, or at some point in the future, workers in the information field will surely have to decide whether they are to concentrate their energies on developing information science within its existing boundaries, or to adopt a fuller definition of their vocation.'[15]

If we choose to adopt the former course, and develop information science within its existing boundaries, then we must accept the most extreme interpretation of the doomsday scenario, and plan for obsolescence.

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Institutions and Learned Societies as information sources

R. J. Millson

Secretary of the Association of Learned and
Professional Society Publishers

Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September 1977

The Learned Society's role

COMMUNICATION IS THE basis of the development of civilization, and advances in communication techniques are both a cause and an effect of developments in science and technology. Probably something similar also applies in the humanities, whereas the arts in themselves represent significant forms of communication. The Industrial Revolution was itself certainly expedited by developments in communication technology, and progress since has been similarly conditioned. The rate at which communications technology can be advanced both from the point of view of techniques and of related hardware will certainly constitute a major factor in the continuing progress of the so-called developed countries and of the rate at which the developing countries progress. Such advances also impact directly on the standards of living of the communities concerned, but at the same time introduce increasing complexities into the everyday lives of the communities, their social structure and everyday work, and many, if not most, of the problems that arise in this complex social structure stem from failures of communication. An industrial dispute is certainly nothing more than a failure of communication between the parties concerned, and the speed with which differences can be settled is dependent, materially, on the speed and level at which communication can be re-established. Of course the technology of communication is an important factor—such as the radio, telephone and written communication but these are only a concomitant to the realization that good communication means good human relations.

These principles were recognized by the early workers in the arts, science and technology who quickly realized the advantages of consultation and discussion with colleagues working in the same or related fields, in attempting to solve problems and to advance knowledge. The Learned Societies did, and still do, epitomize the need for a forum, and quickly assumed the role of information clearing houses for their members.

At the outset the Society was usually nothing more than a meeting place but the advantages of wider communication by publishing discussions and contributions was quickly realized especially with the rapid growth of those communi-

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ties with specialist interests which made it increasingly difficult to continue effective discussion by word of mouth.

It is interesting, for example, that when the Institution of Mechanical Engineers was founded in 1847 the Council immediately formed two sub-committees; one to look after finances, and the other to establish a publishing policy. That policy which was maintained for ninety years, and which was representative of most of the Societies then forming, was to arrange meetings (and later, conferences). They then published for their members the proceedings of transactions of those meetings, which apart from the business of annual meetings were always devoted to the interests of the profession or discipline which the society represented.

Many of these Societies eventually became qualifying bodies in their own right having expanded into the field of education, and especially in the last few years there has been increasing interest in and emphasis on the rights and status of the individual member in his relationship with his profession. The continuing and significant section of activity has nevertheless been that of communication of the methodology and results of research, and matters of common interest by means of the written word.

Whilst the Learned Societies have played a significant part in advancing knowledge they are also facing problems which they themselves have generated. The early papers of the Institution of Mechanical Engineers for example were devoted almost entirely to steam locomotion and the community of its members therefore had a common interest. We now have a vast array of specialisms and sub-disciplines, some of which have little affinity with each other. The Learned Society, a typically rather conservative organization, has therefore had to move itself to cater for the interests of the specialists, bearing in mind that it has a general responsibility to its community of members as a whole, to inform them, and to stimulate cross fertilization of ideas between its disciplines. This need has been recognized in the engineering community by identifying those activities and interests which ought to be of interest to all engineers, for example, design, education, materials, production methods and so on and dealing with these on a global basis, whilst concentrating on the specialisms by way of proceedings or learned journals.

We see, therefore, a polarization of activities in the publishing sense, identifiable not only in the engineering profession, in which a regular members' journal has been developed to cater for the 'horizontal' or general interests, and learned publications for the 'vertical' or specialist interests.

The complexities of advances in science and technology are also beginning to throw up a new problem, that of overlapping interests between Learned Society activities themselves. Examples of this are the steady progress of electronic devices and their use in a large variety of professions, and the development of engineering materials for medical purposes such as implants, where co-operation between engineers and surgeons is necessary. We now find the mechanical engineer involved with designing electronic control devices for forklift trucks, and investigating the mechanical properties of bone and tissue, leading to the emergence of multi-disciplinary, but nevertheless highly specialized, learned publications.

The future of the learned journal

The polarization referred to earlier carries some significant features affecting the learned journal, which it is as well to examine. The members' journal has usually a large and well-established circulation. It is therefore an attractive proposition to the advertiser and consequently can command substantial financial support. The members' journal also usually offers rapid publication compared with the learned publication which is burdened with the full weight of a refereeing system. Not only that, the editor of the members' journal frequently pays his authors for their contributions! These factors have tended to put the learned publication, once the mainstay of the Society, into a secondary role. Huge increases in production costs, diminishing circulation, and the impact of copying are finally beginning to twist the knife. Although every Learned Society publisher recognizes the importance of the role of his learned publications he is more and more inclined to view it as a financial burden which somehow or other he must seek to minimize. Fotunately every such Society has its protagonists who will argue the case for financial support either from the, hopefully, viable members' journal or from other sources of income. Book publishing, for example, is being developed by many Societies in the hope of producing such revenue.

The murmur against the non-viable learned journal is increasing in volume. Many Society members do not see why they should subsidize specialized journals—by means of their membership subscriptions—in which they themselves have no direct interest. To quiet these voices therefore, the Society must at least look at possible means of reducing costs, and in the event possibly adopt alternative and less expensive ways of disseminating learned material. Some ways of effecting this are:

1. Taking the learned journal which covers a number of sub-disciplines and to re-package it into smaller, more specialist, journals. The problem here is that the throughput of papers in a particular sub-discipline may be inadequate to sustain a regular journal.
2. Repackaging into non-serial form, *e.g.* monographs. This avoids the problem of (1), but is a less marketable commodity than a regular journal, because it is not a regular publication.
3. Reporting results of research in a 'brief communications' form. This is useful for reporting developing work; has limited 'in depth' capability but is a browsable publication.
4. Publishing in synoptic form to reduce production and distribution costs supported by full articles 'on demand' at economic prices.

The death knell of the learned journal has however not been sounded. It still has its many protagonists, especially among authors. It can be a viable economic proposition as is evidenced by the range of scholarly journals published by several notable commercial publishers and University Presses. However within several Societies in the UK and USA, at least, its circulation seems to be mainly to academic libraries, who themselves have financial problems. Small circulation learned journals usually carry a high cover price, and the loss of a few subscriptions can be serious to the publisher. Recovering subscriptions lost at renewal time can also be an expensive marketing operation leading to overheads in another sector of the publishing activity. The Society publisher often has a limited marketing facility and understandably seeks to spend his marketing budget in the areas which he considers will produce the best return. These may well not be his learned journal publishing activities.

The setting of standards in learned journal publishing has been an essential feature of society publishing, supported by the full trappings of refereeing and committee consideration. By so doing societies have given authority to their publications and to the authors whose papers they accept. The author has been content to accept this as his reward for the intellectual effort involved in preparing the paper. However, these procedures take time and a paper may be very much out of date when it is published. Society publishers anxious to speed up publication without relaxing standards are faced now with this dilemma in consequence. An author is very likely to offer his paper to the journal which he feels will offer speedy publication and he may not support his own Society if they do not. Some authors, too, are deterred by deteriorating standards of presentation reflected by the use of camera ready copy, and poorly reproduced illustrations, adopted as cost-cutting expediencies although as these practices spread—and indeed they are spreading very rapidly—the reaction will probably diminish.

Using the author as the compositor has introduced new problems such as a much reduced editorial function; lack of uniformity of style and notation; and and printing union problems. Many of these problems can be dealt with by author education, but the extent to which the publisher puts work into a manuscript will of course erode the savings. The writer has carried out some investigations into this problem and found that estimated savings in printing and production costs in a typical learned publication of about 60 per cent—compared with traditional type setting and printing—were eroded to around 25 per cent when the publisher attempted to convert the camera ready copy to a presentable and reasonably uniform style. In addition there was the added problem of the delay in publication arising from this process.

The Learned Society and the user

The Learned Society publisher has tended to be very parochial in adopting criteria for setting learned journal publishing policies. Such policies are often determined by a committee which will embody authors and referees but display a lamentable lack of users. Learned Societies in general (there are exceptions of course) are not noted for their realistic attitudes towards the need for market research before embarking on a new venture, and many new ventures in the writer's experiences arise solely through intensive activity on the part of a pressure group seeking to find an outlet for the learned material which it generates. Such pressure group activity is laudable in the sense that it exemplifies the intense desire of the group to get on with disseminating their work for the good of the community. However, curbing and directing the enthusiasm presents a major problem if the individuals themselves control publishing policy.

Many Societies have established publishing companies and amongst the advantages of this step is that the prospect is offered of developing a more independent attitude to publishing policies as a whole, based on a range of established criteria which did not exist before. The relationship between the publishing company and the Society (or Societies) for whom it provides services may lead to tensions over matters of policy, the allocation of overheads, and so on, but economic performance can be more easily exposed and brought to bear as an essential feature of publishing policy making.

The publishing company can also take a more objective view of its marketing processes, constituting as they do an essential feature of the publishing cycle, and this involves contact with the user. In the writer's view, however, contact at marketing level is not sufficient in itself. The user should be involved at policy making level. 'Users', where learned journals are concerned, fall into several categories. The UK Society member in the writer's experience does not seem to be a notable reader of specialist material which his Society produces. The academic and industrial librarian is undoubtedly the most significant subscriber. Over 90 per cent of the subscribers to a group of learned journals with which the writer was once concerned were sold to librarians (as far as could be determined) and of these over 70 per cent went outside of the UK. The eventual reader is probably interested only in one or two contributions published in each volume. The larger Societies usually have libraries of their own staffed with individuals not only qualified in their profession, but also through experience, very conversant with the demands and needs of their Society's members and often non-members too. Even these librarians rarely seem to be consulted where publishing policy is concerned, although their user contacts could provide an inexpensive and rapid market contact.

The Society library

The Society library has traditionally constituted a source of information to members, and has often also served as a depository for archival material and artifacts. It has provided a social amenity for the visiting member, and has long been regarded as an essential feature of any Society. Until recently its role as a productive unit and as an overhead in terms of space and staff commitment was hardly considered. Now, many Societies are taking a hard look at the financial commitment that a library represents. Often it is sited in an area of high rents; storage and security are ever increasing problems, and utilization tends to decrease in terms of loans to personal visitors, while the cost of postal lending is escalating. The cost-effectiveness of libraries has become a matter of great concern to many Institutions—and indeed the future of many may be in jeopardy. Some Societies are attempting to tackle the problem by converting the facilities from a somewhat passive role into a more active one of providing information services which in turn generate some income or by extending services into non-member territory, for example, by offering information services to Industry. Results of these experiments are variable, and in the event probably the last Society to tackle the problem will be the one who is best able to afford to ignore the financial aspects of the problem. The writer believes that the most efficient and economic role of the Society library rests with its transformation into a small efficient information centre, with rapid access to centralized storage facilities, bearing in mind the accessibility and low accommodation overhead offered by microform, on-line services, and so on. The case for retaining the large independent specialist library within a society is now very difficult to sustain.

The future

The writer believes that the future of Learned Societies as sources of information lies primarily in their desire and ability to educate their members in the adoption and use of new communications technologies, and themselves to experiment with and adopt those technologies. This of course involves expenditure and the provision of public funds for properly conceived and executed developments will undoubtedly be necessary. The survival of Learned Societies depends on two things: the extent to which they can continue to provide members with the services that they require, and thus continue to attract members, who, through their subscriptions help to ensure the continuance of the Society; and the extent to which the Society can by offering membership, thus enhance the status of the individual. This latter point, of course, relates more to qualifying bodies. Services can be offered in various ways, and most significantly by making available information to the member in the course of his professional career. The selling of information to non-members is a useful source of revenue but nevertheless it is the members who are the Society. Societies should therefore first, perhaps, direct their energies to this aspect of their publishing policies in general. The successful build-up of secondary services and data services by notable UK Societies has been a feature of the last few decades, but at least some of their success must be attributed to the availability in certain instances of public funds, notwithstanding the professionalism and the expertise of the individuals involved in these projects. Such projects have not all been successful. It is notable that the ISMEC (Information service in mechanical engineering) current titles journal financed by the Institution of Mechanical Engineers failed after two years. Why? There are probably numerous reasons, but notably they are, in the writer's opinion, lack of knowledge of the potential market, and under-financing. The market was not substantially overestimated but with a low circulation high-priced journal the difference between financial success and failure was relatively few subscriptions.

There is now a vast amount of professional expertise on information transfer techniques, production and marketing, within the Learned Societies and there is an urgent need not only for discussion and exchange of views between the societies but for more collaboration at operational level. Such collaboration is more likely to result in the provision of external financial support than individually conceived projects.

The fates of many small Societies today hang in the balance, and their futures may well be determined by the assumption of professional and realistic attitudes to publishing and to marketing their published material. Because of relatively small revenue from members' subscriptions and often dependence on honorary officers and editors, their vulnerability is so much greater than that of the large established organization. The recent Royal Society Report[1] has done much to highlight the problems of such Societies. Collaboration and support from the larger organizations seems to be the only answer, and survive they must because their contribution to the common fund of knowledge cannot be underestimated.

New techniques and methods in every publishing phase must be explored and evaluated and not dismissed as 'new-fangled'. If Societies are convinced that a new technology is here to stay, they should embark on a programme of education of the users. For example, the utilization of microform as a storage or base for publishing seems to be making slow progress, although there seems to be evidence that user resistance is eroding. Are the problems being accurately identified and tackled? During a three week tour of academic, State and industrial libraries across the United States in 1971, the writer sought the views of librarians as to the likely development of the use of microform editions of learned journals. Almost all the librarians commented on the somewhat emotive attitude of the user as the major problem, although the librarians themselves could see a realistic future for it.

Learned Societies especially are less than aggressive in producing and marketing microform editions of learned material as we evidenced from a recent survey of ALPSP members.[2]

Access to databases must surely feature in the foreseeable future in Society facilities. Such facilities are already well established on a commercial world-wide basis. In engineering, as with, for example politics, decision making is based on the comparing and evaluating as much data as possible connected with the particular problem. The data bank provides rapid access to such information.

Conclusions

The traditional role of the Society as a forum for meetings and conferences, and for publication of proceedings and transactions by conventional methods, is being transformed by changing attitudes and demands of members, financial considerations, and advances in the technologies of transferring information. Whilst the large Societies are often able to resort to, and take advantage of these developments, the smaller Societies which are by far the most numerous, may be unable to contain the pressures. There is a need for collaboration and self-help and signs of these are beginning to be seen. The professionalism of the larger organizations as publishers nowadays ranks with that of any other scholarly publisher but the opportunities for development would seem to be in collective activities, which, hopefully, will lead to support from public funds. A significant gap still seems to exist in many areas between the motivation of the Society and the needs of the librarian and of the eventual user. The best progress can come only from close collaboration and discussion of mutual problems, often generated by the parties themselves.

The writer firmly believes that the future of Society publishing in all its phases rests with critical examination of every advance in communications technology. There is a need for greatly increased rapport between the Society publisher, the Librarian who is the major customer for his scholarly publications —and without whose support many learned journals would cease to exist— and the eventual reader.

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The Research Associations—their contribution to the nation's information store

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Rubber and Plastics Research Association of Great Britain

Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September 1977

IN RECENT YEARS the British Research Associations have come of age commercially. There are a number of reasons for this including changes in Government grant policies, but, by way of introduction, let us simply say that they are now in business. They are in business just as much as any of their Members are in business in their fields. Part of that business, and a very important part, is the supply of information services; and the fact that the Research Associations are now operating in a commercial way should significantly increase their contribution to the nation's information store and reputation.

Definition

Traditionally, Research Associations have been co-operative technical centres serving the corporate needs of their Members. These Members contribute financially to the running of the Research Association and, until very recently, Government also made a substantial grant to general funds. There is therefore a clear distinction between the Research Associations' sources of income and hence their role and those of the contract research organizations.

The Research Association movement was started by Government and British industry shortly after the First World War in a joint effort to accelerate technical advances in Britain after the ravages of the immediately preceding period of history. Consequently, in or around 1920 a number of Research Associations were founded; the first being the British Scientific Instrument Research Association in May 1918 and the most recent addition to the Group, was the British Industrial Biological Research Association. Obviously, during the last sixty years some Research Associations have fallen by the wayside or have been absorbed in others, but at the present time there are about fifty organizations covering materials, *e.g.* rubbers and plastics, iron and steel, cotton and man-made fibres; products, *e.g.* paint, packaging, boots and shoes; and other more wide-ranging fields of interest, *e.g.* production engineering and, indeed, the 'effective management and use of information'. Figure 1 gives some indication of the growth of the Research Association movement since 1919.

Aslib Proceedings, 30 (2), February 1978, p. 55–63. Printed in Great Britain.

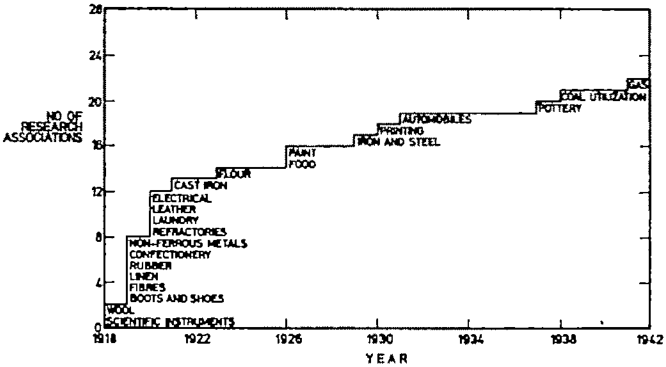

FIG 1: *The early growth of the Research Association movement*

Finance

Figure 2 presents the annual turnover figures for a selection of Research Associations, from which it can be seen that a number of these organizations represent businesses of not inconsiderable size. However it is not the absolute figures which are of interest to the argument of this paper but rather the way in which they are made up. Pre 1960 or even later, the lion's share of income to Research Associations was represented by UK Members' contributions and Government funding. This frankly was a parochial situation, not conducive to expansion of activities. It did not present an environment which encouraged rapid growth of, say, specialized information services which could be made attractive to the world at large. Services, although often of high quality, tended to be traditional and restricted to Member companies and Government departments with sales of publications very much a secondary activity, and individually designed, fee paid information packages almost non-existent.

	£
Boots and shoes (SATRA)	882,978
Fibres (Shirley Institute)	1,116,765
Flour milling and baking	687,103
Food	1,068,486
Furniture	706,305
Hydromechanics (BHRA)	1,325,900
Industrial bilogy (BIBRA)	878,596
Motor industry	1,455,696
Packaging, paper and board (PIRA)	909,431
Paint	383,461
Production engineering	2,600,752
Rubber and plastics	1,183,574
Wool	845,427

FIG 2: *Annual turnover figures for Research Associations 1976*

The picture today is vastly different with the traditional function being supplemented by a developing function whereby the Research Association acts as a contract, as well as a co-operative, technical centre serving the individual needs of its clients.

As far as RAPRA is concerned, as can be seen from Figure 3, Members' subscriptions account for only 33 per cent of the total income nowadays (1976) against 50 per cent in 1960. The Government contribution is now only 13 per cent against 30 per cent in 1960, and, moreover, the terms on which this is available have changed. Other Research Associations present a similar picture and in order to remain viable financially other sources of income have been necessary; hence the significant trend, the growth, to over 40 per cent of total income, in contract work which has occurred at RAPRA.

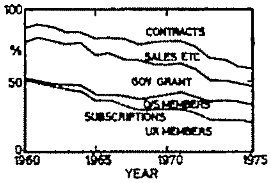

FIG 3: *Distribution of RAPRA income sources 1960–1976.*

This continuing trend has of course had an influence on information services as supplied by the Research Associations. It would be fair to say that these services enjoyed a high reputation among the people who use them but as already indicated, these users have been relatively few. The services are capable of much greater exploitation for the benefit of industry and constitute the raw material for the production of a wider range of higher value products, for the benefit of the Research Associations. Consequently, the environment is right for the Research Associations to increase their contribution to the nation's information effort. Indeed, in their own financial terms, they have to.

What are they doing about it?

Computerization

Figure 4 shows a simple approach to the levels of information services. These have progressed from personal contact, to the publication of a few scientific periodicals, on to the proliferation of many narrowly based scientific periodicals and trade papers, and finally to the need for abstracts for the technical man to keep up-to-date. Subsequently, the number of abstracts on individual subjects has necessitated individual subject abstracts, issued separately. They have recently been stored on computer and are now becoming available on-line.

Obviously, Research Associations since their inception have seen the establishment of specialist libraries, and information centres and the provision of abstracts services as highly appropriate ways (inter alia) to carry out their functions as co-operative organizations working in the interests of industry as a whole.

Many of these collections of abstracts—'data bases' as a word to describe these and other collections is, in our view, misleading—are stored on computer. For example, abstracts from RAPRA, PIRA, the Paint Research Association, *Primary*

Preprints (privately circulated research-in-progress reports)
Research reports, monographs and dissertations
Patents
Periodicals, conference papers, manufacturers' literature

Secondary

Indexes and bibliographies
Indexing and abstracting serials
Reviews and state-of-the-art reports
Reference books—encyclopedias, data handbooks
Translations

Tertiary

Text books
Directories

FIG 4: *Sources of information*

and the Water Research Centre among others are stored and retrieved using the Assassin system developed by ICI Agricultural Division and other Research Associations, *e.g.* the Shirley Institute, the Food Research Association and the Timber Research and Development Association have developed their own computer processing techniques.

Negotiations are presently underway whereby the RAPRA abstracts will be 'put up' in America and in Europe and will be available on-line. We know of similar plans by other Research Associations whereby their data-bases too will be searchable in this way. When this happens, and there is no doubt that it will, it should be seen, most of all by the Research Associations themselves, in context. Certainly it will enable their existing products to have a wider distribution. However, against that can be levelled the accusation of 'following in father's footsteps', simply following the large omnibus 'data-bases', such as *Chemical Abstracts*, *Engineering Index,* INSPEC, and Derwents. Clearly an advantage is that the Research Associations are providing specialized data bases, such as on rubbers and plastics, and no doubt their information will be used as such but we believe that this specialization has not yet been developed to its full potential. There is still much duplication between what is contained in the large data bases and what the Research Associations have to offer at the present time. The Water Research Centre is one notable exception. It plans to use its Assassin-based system in conjunction with the large data bases and not in opposition to them.

Centres of expertise

There may even be too much duplication between the Research Association data bases themselves. However, this is a subject for a later part of this paper.

Research Associations are centres of expertise within particular industries or disciplines. They know the type of information required by these industries and are much more capable than the generalists in providing it within these industries. Consequently, this expertise in the assessment of information should be reflected in the computerized data bases.

Before expanding this important point any further it is necessary to emphasize that we are referring here specifically to computerized data bases and not inferring necessarily that these are the same as abstracts periodicals. There may be good reasons why duplication can be tolerated in the latter. For example Research Association Members may expect a comprehensive periodical.

	%
Technical	
References and advice on technology	55
Scientific/academic information	10
Commercial	
Marketing information/statistics	13
Trade names	13
Patents	9

FIG 5: *RAPRA information centre enquiries*

Figure 5 shows the type of enquiries which are dealt with most frequently at RAPRA. By far and away the vast majority of these can be classified as commercial and technological as distinct from academic and scientific. A similar breakdown of enquiries has been published by the Flour Milling and Baking Research Associations which shows the same trend. At the same time *RAPRA Abstracts* is biased in the other direction and for reasons already mentioned may need to remain so.

Consequently, it is our contention that the Research Associations can make a more meaningful and better contribution to the nation's information store by recognizing that computerized information banks will become more commonplace as time passes and that their place in this development is the provision of specialized data which they *now* know their industries require. It is not their place to develop computerized mini-versions of *Chemical Abstracts* in their own fields.

Another point is also important. At the present time the bulk of searches done *on-line* is for academic information but as on-line becomes more widespread rising from 60,000 to a million users in 1980, the requirements will change to more specific and commercial-type information. It is necessary for the Research Associations to anticipate this demand and be ready to meet it.

At RAPRA for example there is a comprehensive trade-name index on rubber and plastics materials and products. There is a similar index at the Paint Research Association too. The RAPRA index has been extended recently to cover new developments whether trade-named or not. Again at RAPRA there are collections of data on chemical resistance and toxicity and a recently compiled collection of import and export statistics on rubber products soon to be extended to plastics products. All of these on-going projects are critical evaluations of the existing literature rather than a regurgitation of it and allied to carefully selected abstracts of a commercial, economic and technological bias would form the kind of specialized data bank which will be required in the near future.

RAPRA is in no way unique in having compiled collections of specific data.

Indeed, not only is it not unique but a number of other Research Associations, including BIBRA, the Glass Research Association, Flour Milling and Baking, the Food Research Association, Machine Tools, Paint, PIRA, and SATRA, have chosen the same subject areas, specifically toxicity, other important current legislation, and economics and statistics, for special attention. Regretfully, perhaps, there has not been sufficient, if any, collaboration in the generation and use of the data.

Collaboration

Ideally, there should be little or no overlap between data bases from the user's point of view. From the compiler's point of view this is difficult in the preservation of an identity of a specialized data bank. Clearly there are certain types of information which the compiler of a data base would have to think very carefully about before their incorporation. For example, patents on any subject are so numerous and are already covered in a very comprehensive data base. However, the acquisition of data in a form suitable for direct incorporation into a data bank or publication and the provision of the same are desirable aims.

The Research Associations are good examples of organizations where these aims can be achieved. The textile Research Associations, specifically the Hosiery and Allied Trades Research Association, and the Shirley Institute, have already achieved this situation with the Shirley Institute carrying the brunt of the work and have gone on to greater collaboration with the French Textile Institute in Paris in the provision of abstracts to the Titus system which converts abstracts in one language to another three languages automatically. The Building Services Research Association has been collaborating with a number of similar European organizations in the generation of a joint data base for Thermal Abstracts and SATRA combines with its European counterparts in a similar way.

These are the only three collaboration schemes of which we are aware. Obviously, co-operation of this kind among organizations working in a similar field is desirable so as to get the most profitable return on the staff which are available. Closer to home as far as we are concerned is the still inadequate collaboration between RAPRA, PIRA, and PRA in spite of the fact that all three utilize the Assassin system which should make collaboration easier.

Bridging the gap

Collaboration is almost always taken to mean the pooling of resources of two or more organizations in order to eliminate duplication. This is of course important and makes for greater efficiency as the Shirley Institute and others have shown.

There is another kind of collaboration which is equally important. This is the pooling of resources of two or more organizations *not* to eliminate duplication but to bridge the gap between two apparently different factions of industry. We submit that this is an area where the Research Associations already have the network to enable them to take the lead. Purely by way of example RAPRA has produced Rubbers and Plastics in Medicine in collaboration with Medlars but it does not take much imagination to think of many more titles which could be produced by this one Research Association in collaboration with others.

Added value

We have concentrated so far on traditional information services, particularly abstracts, their accessibility mechanically, collaboration in their production, and their amalgamation to greater effect. We have only touched on the analysis of information and its use to provide added value products.

Figure 6 shows the organization of the Information Centre at Shawbury. We mentioned earlier the trend in the sources of income of Research Associations and the consequent increase in importance of contract work. Contract work in no way should be construed as the sole province of the laboratories. We have established at RAPRA a substantial growth area in information services and the structure of our Information Centre reflects this. Consequently and increasingly the Research Associations' contribution to the nation's information store will be not only in basic services, i.e. abstracts, but in the interpretation and use of that information. To put it another way they will be providing a service as well as a product.

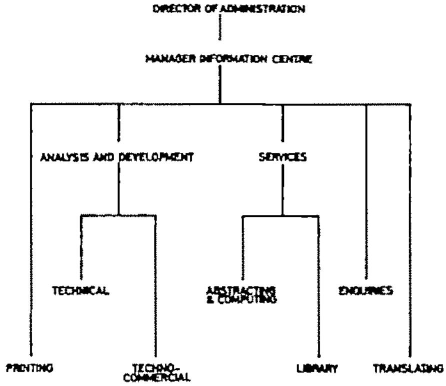

FIG 6: *RAPRA information organization*

Translations

A simple example of the development of attitude to information services is International Polymer Science and Technology. Some years ago RAPRA was responsible for the cover-to-cover translation of two Russian periodicals. These were Government-sponsored and losing money. We conceived the idea of adding other publications, both in Russian and other languages, not doing them cover-to-cover but asking subscribers to tell us what they wanted, and charging a realistic price. The contract is now on a profit-sharing basis and has given birth to book translations and other associated services. We put this success down to understanding the market and inviting customer participation.

The British Library Lending Division at Boston Spa has for many years been the moving spirit behind the translation of Russian work into English and we believe that it will actively encourage other Research Associations to follow

RAPRA's lead and develop their translations services into more useful and commercially acceptable propositions. A further development too must surely be that there must be a greater pooling of translations between individual Research Associations in order to bridge the gap between technologies and consequently enhance the value of the present services to their subscribers.

We like to think that RAPRA is one of the leading Research Associations in the translations business but at the same time happy to learn from the Research Associations such as the Shirley Institute whose extended summaries of foreign papers have met with considerable success.

Commercial information

We indicated at the beginning of this paper that the concept of the Research Association is changing fast. The pattern of work nowadays is such that the words 'Research Association' fail to conjure up a fair reflection of the broad spectrum of work undertaken. At RAPRA we have sub-titled ourselves 'the international technical centre for rubbers and plastics' which from the information point of view still leaves something to be desired. Techno-economic surveys and market research, for example, are areas which have shown considerable growth in recent years.

Recently completed at RAPRA have been analyses of the exports and imports of tyres and other rubber products on a world-wide basis for the National Economic Development Council and we are going on to prepare similar analyses for plastics products. Another project just finished (for the Department of Industry) was on the markets for fibre reinforced plastics. RAPRA is not unique in this area of activity and many other Associations are becoming increasingly involved in what can be broadly called commercial subjects. For example we note from the SATRA Annual Report for 1976 that major surveys were undertaken on upper and soling materials and chemicals, and studies were conducted on material shortages and labelling requirements in various countries. It would be fair to say however that most Research Associations collect the information for others to use and fall short of using the information themselves to generate added value products. We were in this position at RAPRA a comparatively short time ago but by the addition of an economist to our staff and by using the services of an experienced market researcher we can now compete on an equal footing with those who fed on our advice and information in the past. This is a development which we feel will be followed by other Research Associations in the future.

Under the broad umbrella of commercial information there are indeed many products which the Research Associations are in a position to make available now, such as authoritative directories of one kind or another, and which would not only be beneficial financially to Research Associations themselves but be of direct assistance to their Members.

On the more technical side too, just as with commercial information, there is the opportunity for the Research Associations to exploit to a greater extent the vast body of interpretive information which appears to exist particularly on toxicity, safety and other matters of legal concern in addition to subject areas associated directly with their own industries.

Conclusions

It has been our brief today to examine critically the contributions the Research Associations are making to the nation's information store and to suggest how these might be improved. It has not been our intention to give a catalogue of the various publications and services available from Research Associations and to undertake a selling exercise. Objectivity is difficult for us, coming as we do from a Research Association, but we have tried to be critical and perhaps controversial in order to illustrate to you, the user, that some Research Associations are conscious of the need to extend their image and to get out into the market place.

In the preparation of this paper we have consulted a substantial body of information emanating from the Research Associations. From this it is quite clear that most have something to offer in the specialized information sense as well as the conventional. At the same time it is also clear that it is the minority which is concerned about the exploitation and marketing of that information. Far too often one is left with the impression that the information is accessible only to Members and is available within their subscription. Obviously Members must have privileged access but at the same time non-Members should have some access but at a price. The advantage of this approach is that the monies made can be channelled back to improve the service and thereby the benefits Members receive for their subscriptions.

It has been our experience in the past that large Member companies of Research Associations particularly have looked upon the information services provided as supplementary to their own efforts. Nowadays with the increase in the amount of information available and the corresponding increase in costs of processing and storage these companies are looking to Research Associations and others for information packages tailored to their needs. PIRA and RAPRA are two Research Associations which are actively engaged in the provision of these services.

Clearly these tailor-made services to customers must be paid for in this day and age even by Members. Research Associations apparently incur no difficulties in this direction. Customers expect to pay for a good service and the Research Associations themselves have a better measure of the value of their products. The message, therefore, is that while the Research Associations will undoubtedly improve their services on the information front in all aspects there is a price to pay for these improvements which the customer will have to meet.

We have indicated today a number of ways in which Research Association information services can be improved. Collaboration to prevent duplication is obvious. Collaboration from the point of view of exchange of experience is equally obvious but perhaps not practised as often as it might be. The recognition that services should be oriented to the customer and specialists, *e.g.* legal experts, economists, and technologists, employed to interpret the information is equally important.

Finally, Research Associations must go out into the market place and sell their products. They must come to conferences such as this and meet their customers. The fact that the number of Research Associations represented here this morning can be counted on the fingers of one hand may perhaps be taken as an indication that this lesson at least remains to be learned.

Industrial information resources

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Paper presented at the 51st Aslib Annual Conference, University of Lancaster, 20th–23rd September 1977

Introduction

PREVIOUS PAPERS HAVE discussed 'public-funded' information resources. We should remind ourselves that public funds come from the economic resource of the country—and that comes from Industry and Commerce.

Yet the information resource created, held and used by big industry is seen by some as an evil. In fact, to some people anything created, held and used by big industry is evil, particularly if the industry is transnational. Industry is accused of being an unscrupulous hoarder and manipulator of information, because knowledge is power. (Rickson: *Human Organisation* **35**, 3, 1976, p. 239.)

Industry on the other hand, showing no signs of complacency with regard to its knowledge power, has increased its cries for better publicly available information. (Lamy: *Aslib Proceedings* **27**, (11), 1975, p. 447 and Aslib, most conferences and seminars!)

So at least there is agreement on the need for better availability of information, but not on what information.

The industrial information resource is the property of a company. Either the knowledge was generated internally or public information was processed internally to create a new information product of, presumed, greater value to the company.

We have to ask how such proprietary information can relate to a possible National Plan, the underlying theme of this Conference.

The theme

Question:	Does Industry see its information resource as part of a national resource?
Answer:	It depends what you mean by 'part'. If it means freely available to any individual in the nation—NO. If it means contributing to the national economy—YES.

Information has its individuality, its distinction, but nevertheless deserves, as a resource, to be examined by the same criteria as other, equally distinctive, resources such as, for example, capital, labour and technological skills.

An enterprise as a whole, or indeed manufacturing industry as a whole, is a part of the national resource and makes its contribution (or fails to) by its provision of goods or services, of employment, of taxes, or to the balance of payments.

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To do this, the enterprise must use effectively the resources it can muster. For example, today everyone talks of capital investment, or lack of it, but the crux is how well or badly the capital resource is used. Just spending money is not automatically profitable. This is an area of much discussion and no little dispute.

But—what is *not* disputable is that (except in a completely corporate state), while the whole *enterprise* is a part of national economic resource, its capital is not a disposable part of the national capital resource—in fact, it belongs to the shareholders.

To my mind, exactly the same arguments apply to the information resource. To put it crudely, a better (more efficient, more effective, larger etc.) company information resource makes a better company making a better contribution to the national economy.

It is for the company to decide in its wisdom which parts, if any, of its information resource it wishes to contribute to the national information store. In fact, enlightened self-interest points to release of as much information as possible, *provided* the company's competitive position is not thereby endangered; to endanger the company by profligacy with the information resource would reduce the contribution to national economic resource.

This really is all rather obvious, yet it needs restating regularly. Not only to combat the covetous—and there are many—but also to define as a policy the positive intention and confound the miserly hoarders to be found in every organization.

Going back to the first question and answer, industrial information as a totality is *not* part of the national resource in the sense that it is available to all. But some parts are *e.g.*:

Mutual self-help through ASLIB, etc.
Scientific publications and patents.
Economic and business publications especially Annual Reports.

We will not squander our information stock any more than our cash stock. Indeed, in my former company, Unilever, information security is checked by Internal Audit on the same lines as conventional asset security.

The Practice

Having established some principles, we must now examine the practice. Three particular elements are important to our theme:

(a) How companies organize their own information.
(b) How companies access their information for their own use.
(c) How companies make their information selectively available to others.

And then consider if and how and where these practices conflict with each other and with the hopes for a National Plan.

There seems to be an historical sequence of nomenclature from Library to Information Department to—I wonder?—Intelligence Department. The sequence is quite logical. We Information squirrels have always been faced with a fluctuating crop of information nuts—some wild, *i.e.* needing to be sought out, some cultivated, our own researches—nuts which ripened at a time when perhaps we were not hungry. So the first task was to create a store—the Library.

Sometimes we forgot where we put the nuts, but methods improved until the Information Department treated the storing of the nuts and finding the nuts on demand as combined operations.

The next stage has only just begun. The Librarian stored the nuts. The Information Scientist stored and retrieved them. The Intelligence Officer will store, retrieve and create or guide corporate policy by innovative processing of the nuts.

(a) *The consequent organization of industrial information services* is relevant to the conference theme, because, again for historical reasons, we normally do it in the way least appropriate for 'nationalization'.

Thus the 'stores' were, and still are, part of the appropriate sub-units of the enterprise—the Research Library, Economic Information Section, Advertising Department Records etc., Research usually being the largest and most developed. The subsequent growth up to the Computer Age did little to change this. Each group adopted its own special approaches as required by the field of operation and the needs of the business section concerned. Common techniques were introduced with the help of the professional links of the library and information staff with their colleagues in other organizations, but the liaison within the enterprise was not good until it started being essential.

When scientists started asking for marketing data and economists started wanting to know the scientific bases for business trends, the concept of an integrated company information resource began to be voiced.

(b) *A company's information resource is in two parts*:

1. Proprietary information. Generated internally *e.g.* by experimentation, market and consumer surveys or by judicious review and combination of knowledge which is publicly available but dispersed. Also includes purchased information *e.g.* from agencies or consultants.
2. Information selected from public sources (*e.g.* the literature) which has been organized by the company's expertise to permit rapid access, assimilation and ease of exploitation. Internal processing of the information content of some of this material *e.g.* via an Intelligence or Information Analysis Unit, will transform it into proprietary information.

The most vital aspect of the internal organization of information is that the proprietary material should be processed into a form that will cause its maximum impact, especially of course in assisting the decision for which it was initially commissioned. Hence the raw scientific data held in laboratory note-books in manuscript form must be upgraded for presentation to the next stage of the decision processes *e.g.* as a well produced and illustrated report or lecture: the initial results from consumer studies must be subjected to the statistical analysis and judgment of experts and be interpreted and upgraded to a form which can be understood by those who commissioned the work who may well not be expert in this particular area.

The upgrading of information in this way, as well as increasing its impact for its initially conceived purpose, has two further effects:

1. It presents the information in a form that is more easily handled by the conventional information systems of current awareness and information storage and retrieval.
2. Parties in the Company who learn of the material via the above information services are presented with a package of information which has already been processed to a more easily assimilable form.

This processed information is distinguished by:

1. High direct relevance to the aim of the organization.
2. Security aspects in as much as it indicates Company planning or commercial intentions.

Generally these aspects influence (i) the level of information content selected from the original documents and held within the information mechanics *e.g.* titles or full abstracts held in bulletins or indexes, and (ii) the special treatment of confidential material and its restricted access.

Current Awareness is an ever-present need for harassed managers. It can be met by:

1. Circulation of the documents themselves, when practicable, *e.g.* reports, journals and patents. The handling of new books etc. presents obvious problems with these simple mechanics.
2. General announcements of new materials acquired or noted by the information unit. These are bulletins whose structure varies with:
    - (i) Degree of information content *viz.* titles, enriched titles or abstracts. (In Unilever Research all scientists write separate abstracts for their reports which provide the basis of an excellent Current Awareness system.)

    and
    - (ii) Degree of subject classification, *i.e.* internal subject groups within the bulletins or separate bulletins on different topics.
3. SDI processes based on computer or human matching of document content and personal interest profiles.

    Possibly some of this could be covered on a 'national basis'. *The Financial Times* would probably say that it does so already!

Predominantly, the accessing of information is done by the requester himself with the information function being mainly concerned with providing the means.

The requester accesses the information:

1. By reacting with the Current Awareness media.
2. By consulting information retrieval devices for retrospective information. This is often done with advice or assistance from information staff when the process is difficult due to:
    - (i) excessive number and complexity of sources, *e.g.* a library of reference manuals.
    - (ii) complex indexing philosophy or systems mechanics, *e.g.* highly structured indexes or computer-terminal interrogation.

If the enquirer is at a distance from the information unit or is a senior person the accessing of information is normally done by information staff on his behalf.

Information units frequently receive requests beyond the simple locating of information; these form the basis of an Intelligence or Information Analysis function. These requests require:

1. A knowledge of the existence, the organization and the operation of enterprises, Government Departments, external companies, Trade Associations, Special Libraries etc., that enables the Information Scientists sleuth-like to track down information, frequently widely dispersed that is not held in any organized system or recorded in any public form.
2. An assembly and analysis of information to present a perspective or implication that was not discernible in its separate parts.

It is in this area that we are seeing the next step in the evolution of the information function. This process started with the passive library, moving through the pro-active library with staff having subject knowledge to the information section that we have seen in the last decade.

The future undoubtedly lies in a fusion of the information handling techniques (both the technologically advanced and the Sherlock Holmes approach) with a team having high subject competence. Their role will be to provide intelligence overviews in strategic areas, both to meet specific requests and on their own initiative arising from their knowledge of the Company's operations and the implications they can see in the information they are handling. This is the dawn of the Intelligence function I mentioned earlier, but there are still severe organizational difficulties ahead.

(c) The third element I postulated was *How do we make our information selectively available to others?* In the scientific field there is no great problem, once a policy has been agreed. In contradiction to the nasty thoughts with which I started, most major companies today would say to their scientists 'Publish unless it breaks commercial security or offends corporate policy' and *not* 'Only publish if it directly supports company policy'. Therefore the only necessity is a well-organized internal refereeing system covering the three criteria—scientific quality, security and corporate policy. This can work very smoothly in geographically and managerially compact units.

But extended outside Research, there are many problems. A tactically advantageous disclosure in one country could be strategically disastrous in another. The only way seems to be to rely on a lot of personal commonsense at management levels and to back up by well-circulated (and probably publicized as much as possible) Corporate Policy Papers to give guidance to the out-stations.

At the top-level, disclosure itself is an act of policy. The care which goes into the words and music of Annual Reports seems not to be recognized by their many critics, who nevertheless draw extensively on them for facts.

The conclusions

It is clear, to me at any rate, that the information market is no way as tidily organized as the capital market to which I compared it earlier. Nor can it be.

The sub-units of the information resource (technical, economic, marketing etc.) are not inter-convertible in the way that are the sub-units of the capital resource (fixed assets, cash-in-hand, DMarks, Dollars). In fact information is very difficult to price and value—it can be costed, but this is very different from value.

Question: So where do we stand in our dual policy of:
(a) safeguarding the competitive position of the enterprise and
(b) additionally contributing to the national economy?
Answer: We make heavy weather of it, because of the organizational conflicts.

There is nothing to be done which is simple and at-a-stroke. The heterogeneity of industry and of the respective information resources makes that obvious.

However, the extended use of computerized storage and searching is forcing a greater degree of uniformity in practice and forcing the taking of decisions on information security. This will happen slowly, partly because it is very expensive and the rewards by no means always commensurate (or measurable!). Nevertheless it will happen, and must.

We have a further contribution to make to carrying out the policy. We Information Management must be far more ambitious and clear-thinking in our definition of the tasks accruing to our function in the organization. A greater responsibility must be assumed (with justification) for advising on acts of publication or release. The information officer must never again say 'Here is the stuff, what you do with it is your business'. We must be active, not passive, move into the Intelligence role.

This approach does offer a hope to the supporters of a National Information Service. If such existed and was really good, Industry could stop abstracting or noting published information, only storing its own generated matter. Then it could concentrate on the Intelligence function. Furthermore, the Information Management would need to be more united in their organizations and we will also need to understand very much better the External Affairs and Public Relations business.

DISCUSSION

MR P. J. RUSSELL (Water Research Centre) commented that many industrial members of the Water Research Association had access to millions of abstracts on a number of on-line data bases. He asked whether the speakers believed that the greater availability of on-line data bases would lead to a decline in membership of the Research Associations.

MR A. B. DAVEY replied that if the Research Associations were offering a limited amount of services there might be some danger of this happening. However, most Research Associations offer other services besides information services. He believed, in spite of the availability of on-line services, that RAPRA had something special to offer to the Plastics industry.

MR J. FULMER pointed out that the Research Associations had expressed regret at the elimination of Industrial Liaison Officers from industrial organizations. He felt that more thought should be given to the question of Industrial Liaison Officers and that something ought to be done about it.

MR J. MACLACHLAN affirmed that the Research Associations wanted contact with industry at all levels and at all times. The Industrial Liaison Officers were a good mechanism for making these contacts and he regretted their loss.

MS GERDA YSKA (Associated Scientific Publishers) asked Mr Millson what was the reaction of authors to having their material published in synoptic format.

MR R. J. MILLSON replied that he was currently conducting a research project concerned with evaluating the reactions of authors, libraries etc. to synoptic publishing. He was half way through this project and had not evaluated all the reactions as yet but it appeared that the authors were pleased with synoptic publishing. He went on to say that the IEE were about to embark on a synoptic journal and that they would be in a better position to provide this information.

MS GRETCHEN E. TAYLOR (Offshore Information Literature) commented that when approaching the Library of the Institution of Mechanical Engineers for information etc. she met with what appeared to be a 'closed shop'.

MR R. J. MILLSON stated that his contact with the library would have been minimal at all times as he worked in publishing. However, he believed that the library was a large one and a good one and if one had met with a problem it was probably one of personality rather than that of the system.

MR O. S. HANSEN (Danfoss) asked whether one could claim services from a Research Association without being a member of it. He particularly wanted to know what the position was for overseas enquirers.

MR J. MACLACHLAN replied that there should be no problem in claiming services from the Research Association where he was employed, if one was not a member of it. However, he hoped that Mr Hansen's organization would become a member of it.

MR R. E. CAWKELL (Institute for Scientific Information) asked Professor Wilkinson whether he had had any experience with cost benefit analysis. Mr Cawkell knew of at least one member of the audience who decried it, mainly because it was very difficult. The advantages of developing it were very great however, as a tangible resource brought with it a tangible slice of the company cake and tangible rewards for people. It was interesting that the Property Services Agency—a part of the Department of the Environment and one of the largest organizations in the country—was spending a substantial sum of money on a cost benefit analysis project at a time of financial stringency. This study was still in progress, but the results obtained so far, had been very revealing. A new methodology was being developed, and a particularly interesting aspect was the attitude of the people, at all levels of the organization, towards existing or proposed information services. It seemed to be a surprise to many persons to be asked to concentrate, for a moment, upon information as an entity.

PROFESSOR J. B. WILKINSON replied that he had not had such experience. In his organization they tackled the problem by trying to put a value on research, considering information as a part of research. They had made four attempts to do cost benefit analysis of research and failed. The studies did produce figures but such information is of no use unless they have an effect on management. They did not have an effect on management, so the studies were regarded as failures.

MR T. MURPHY (The National Computing Centre Ltd) commented that cost benefit analysis implied that one enumerated benefits and therefore beneficiaries. It was all too obvious for management to say 'those who benefit pay'. The likely exceptions occurred where individually small benefits were received by a large number of individuals or where social benefit could be clearly demonstrated. So far, the UK Government and company management had not accepted these arguments for information services.

MR L. S. ADLER (Chemical Industries Association) referred to some points made by previous speakers. He noted that John Pickup remarked that information suppliers must help influence managements of small companies to change their attitudes to information; Colin Offor had asked how many information officers handle management information, production information, accountancy information etc, and also that Professor Wilkinson had said that information in companies must be integrated so that information departments become intelligence departments. Mr Adler then observed that a general thread ran through these three remarks and wondered whether any of the speakers could suggest:

1. How to bring about the change in managerial attitude.
2. How to bring about the equally necessary change in information officers' attitudes.

MR A. B. DAVEY replied that financial necessity will make capital industry look more towards information. Senior management will have to realize the value of information and we will have to convince management that we have something useful to offer.

PROFESSOR J. B. WILKINSON stated that this calls for employing more extroverted staff.

MR A. B. DAVEY added that we would have to go out and sell our services.

MR D. DUNBAR (J. Walter Thompson) said that information departments could benefit by employing staff from other departments within the organization.

MS G. E. TAYLOR pointed out that there was some danger in the policy advocated by Mr Dunbar, of information departments all too easily becoming the dustbin for people who cannot find a suitable niche elsewhere in the company. She illustrated this point by referring to a recent case where a person employed in Public Relations for the Open University was placed in a 'more suitable' position in the Open University's Information Department, because he was at the centre of some controversy concerning the membership of the Paedophilia Information Exchange.

DR D. LEWIS (ICI Ltd, Plastics Division) agreed with this remark and stated that he too knew of a case where an information manager was recently approached by another manager, who asked the former whether he could take on someone who was having a nervous breakdown.

Toward a national program for library and information services: progress and problems

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INTEREST AND SUPPORT for a National Commission on Libraries developed in the early 1960s. The idea was supported by such diverse and important groups as the American Library Association, the US Bureau of the Budget (now the Office of Management and Budget), the Office of Science and Technology, and the US Office of Education.

National Advisory Committee on Libraries

Much concentrated effort and persistence with both the Kennedy and Johnson administrations resulted in the establishment of a National Advisory Committee on Libraries (NACL) in the Autumn of 1966. By Executive Order, President Johnson charged the temporary commission with four responsibilities. They were:

1. Make a comprehensive study and appraisal of the role of libraries as resources for scholarly pursuits, as centres for the dissemination of knowledge, and as components of the evolving national information systems.
2. Appraise the policies, program, and practices of public agencies and private institutions and organizations together with other factors which have a bearing on the role and effective utilization of libraries.
3. Appraise library funding, including Federal support of libraries, to determine how funds available for the construction and support of libraries and library services can be more effectively and efficiently utilized, and
4. Develop recommendations for action by Government or private institutions and organizations designed to ensure an effective and efficient library system for the nation.

The Commission of twenty librarians and educators was headed by a distinguished team comprising Douglas M. Knight, President of Duke University, Chairman, and Frederick Burkhardt, President of the American Council of Learned Societies, Vice Chairman. It had modest staff support. The Commissioners met eleven times, held many regional hearings, sponsored thirteen

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special studies and on 1st July, 1968, issued their report and recommendations. Their fundamental recommendation was, 'That it be declared National Policy, enunciated by the President and enacted into law by the Congress, that the American people should be provided with library and informational services adequate to their needs, and that the Federal Government, in collaboration with the state and local governments and private agencies, should exercise leadership in assuring the provision of such services.'

To work toward the achievement of this goal, six broad and fundamental objectives were formulated and five specific recommendations designed to provide a sound basis for a realistic means for immediate action were enunciated.

The recommendations

1. The establishment of a National Commission on Libraries and Information Science as a continuing Federal Planning Agency.
2. The recognition and strengthening of the role of the Library of Congress as the National Library of the United States and establishment of a Board of Advisers.
3. The establishment of a Federal Institute of Library and Information Science as a principal centre for basic and applied research in all relevant areas.
4. The recognition and full acceptance of the critically important role the United States Office of Education currently plays in meeting needs for library services.
5. The strengthening of state library agencies to overcome deficiencies in fulfilling their current functions.

National Commission on Libraries and Information Science

To implement the first recommendation, bills were presented to the 91st Congress (1969) and hearings were held in the spring. Members of Congress, former Members of the Advisory Commission, the Librarian of Congress, and leaders of library and educational organizations gave their enthusiastic support to the proposed legislation. The only dissenting voice was from an official of the Office of Education. He contended that the proposed Commission should not be an independent agency, that several of its members should be high governmental officials, and that all of the appointed members should be named by the Secretary of Health, Education, and Welfare. The Congress responded by passing the bill establishing a National Commission on Libraries and Information Science as a permanent, independent agency with a membership consisting of:

> . . . the Librarian of Congress and fourteen members appointed by the President, by and with the advice and consent of the Senate. Five members of the Commission shall be professional librarians or information specialists, and the remainder shall be persons having special competence or interest in the needs of our society for library and information services, at least one of whom shall be knowledgeable with respect to the technological aspects of library and information services and sciences, and at least one other of whom shall be knowledgeable with respect to the library and information service

> and science needs of the elderly. One of the members of the Commission shall be designated by the President as Chairman of the Commission. The terms of office of the appointive members of the Commission shall be five years.'

Towards a national policy

The bill was signed into law (Public Law 91–345) on 20th July, 1970, and the first Commission members were appointed in July 1971. The Commission held its first meeting in September of that year. The importance and impact for libraries and information services of this law cannot be overstated. The law provides a strong, positive national policy:

> 'The Congress hereby affirms that library and information services adequate to meet the needs of the people of the United States are essential to achieve national goals and to utilize most effectively the Nation's educational resources and that the Federal Government will cooperate with State and Local Governments and public and private agencies in assuring optimum provision of such services.'

Work of the Commission

The law assigns to the Commission primary responsibility for developing and recommending overall plans for meeting national library and informational needs and for advising the President and the Congress on implementation of national policy. The Commission has the responsibility for developing plans for the coordination of activities at the Federal, state and local levels, for advising Federal, state, local and private agencies regarding library and information science, for appraising the adequacies and deficiencies of current library and information resources and services, and for evaluating the effectiveness of current library and information science programs.

The Commission is authorized to conduct studies, surveys, and analyses of the library and informational needs of the nation, including the special library and informational needs of rural areas, of economically, socially, or culturally deprived persons, and of elderly persons, and the means by which these needs may be met through information centres, through the libraries of elementary and secondary schools and institutions of higher education, and through public, research, special, and other types of libraries and to promote research and development activities which will extend and improve the Nation's library and information-handling capability as essential links in the national communications networks. The Commission reports annually on its activities to both the President and the Congress.

Framework for development

While the consideration and possible implementation of the other four recommendations of the National Advisory Committee on Libraries also became the responsibility of the new Commission, the members felt that these and many other questions were facets of the larger problem of determining where library and information services in the United States ought to go and how best to get there. Therefore, the Commission decided that its first step should be to develop a national program for library and information services to provide a framework and focus for its efforts. The Commission recognized that an effective program could only be developed with the active participation of the library and information science community. In the final analysis, the success of implementation of any program or plan depends on its acceptance by the various segments of the constituencies affected. In the Commission's National Program Document, *Toward a National Program for Library and Information Services: Goals for Action*, recognition of the importance of constituency support for the formulation of national library policy is noted.

> 'Its realization depends upon the approval of the Congress and the President, state legislatures and officials, all those responsible for and interested in library and information services, and, ultimately, upon the support the program receives from the United States citizenry.'

The Commission held *regional hearings* throughout the entire United States. They were sited to give the widest possible geographic coverage, and they were organized, publicized and conducted so as to evoke the broadest possible demographic response. In addition to these formal hearings, various Commissioners, singly and in twos and threes, conducted mini-hearings to delve more deeply into the problems of special constituencies, and, in 1973, the Commission sponsored a special two-day invitational *conference on user needs*. The Commission also endeavoured to develop and maintain constant two-way communication with every association or institution that might conceivably have something to contribute.

The response was gratifying and, at times, almost overwhelming. At every hearing the schedule was filled, and all of the time set aside for unscheduled public testimony was invariably filled by interested citizens anxious to make their contribution to the Commission's efforts. The response to the initial versions of the program document was equally gratifying. In spite of initial distributions in the thousands of copies, the issuance of every draft and revision resulted in a flood of requests for copies. Nor were these copies simply put on a shelf or filed. Suggestions for changes, additions, deletions, *et al*, came to the Commission by postcards, letters, and formal statements, by written and oral testimony at hearings, and by telephone and telegram. Commissioners and staff were approached at meetings and conferences by individuals and groups of people who wanted to offer their comments. The volume of comment would have been, by itself, encouraging. However, the comments revealed that most people were reading the documents thoroughly and offering suggestions on the basis of careful analysis. For the most part, the criticisms were constructive in intent and focused on priorities and perceived emphases, without challenging the basic concepts and objectives. There can be no question that there is great interest in and enthusiasm for a national programme for library and information services.

It was, of course, impossible to incorporate all of the suggestions the Commission received into the programme document. Some of them were not relevant to the Commission's charter or dealt with levels of detail that were inappropriate, and many of them were mutually contradictory. Nevertheless, every suggestion was considered in the preparation of the final document, which we believe represents, as nearly as can be achieved, a consensus of the library/information community and the public at large on the assumptions and objectives of a national program.

National Program Document

The *National Program Document* was adopted by the Commission in May 1975 and published in June. It quickly received the support, in principle and concept, of the major professional library and information service associations—the American Library Association, the Association of Research Libraries, the Special Libraries Association, the American Society for Information Science, the Medical Library Association, the American Association of Law Libraries, and the National Federation of Abstracting and Indexing Services.

The Program Document clearly reflects the Commission's working philosophy, which is user-oriented. It is the Commission's intent that the users of information, including potential as well as current users, should be the principal focus of a national program. Its overall goal is:

> 'To eventually provide every individual in the United States with equal opportunity of access to that part of the total information resource which will satisfy the individual's educational, working, cultural and leisure-time needs and interests, regardless of the individual's location, social or physical condition or level of intellectual achievement.'

This is a broad charge and a heavy responsibility, and we expect it will take many years to effect such a service in anywhere near a satisfactory manner.

Toward that achievement, the Commission has identified in the program document, five assumptions and eight objectives which were formulated on the basis of the testimony received through regional hearings and reflect a sense of national needs from user communities throughout the nation.

The five basic assumptions

(1) That the total library and information resource in the United States is a national resource which should be developed, strengthened, organized and made available to the maximum degree possible in the public interest. This national resource represents the cumulated and growing record of much of our nation's, and indeed, much of the world's, total cultural experience—intellectual, social, technological, and spiritual.

(2) That all of the people of the United States have the right, according to their individual needs, to realistic and convenient access to this national resource for their personal enrichment and achievement, and thereby for the progress of society.

(3) That with the help of new technology and with national resolve, the disparate and discrete collections of recorded information in the United States can become, in due course, an integrated national network.

(4) That the rights and interests of authors, publishers, and other providers

of information be recognized in the national program in ways which maintain their economic and competitive viability.

(5) That legislation devised for the coherent development of library and information services will not undermine constitutionally-protected rights of personal privacy and intellectual freedom, and will preserve local, state and regional autonomy.

The eight objectives

The first objective reads: 'To ensure that basic minimums of library and information services adequate to meet the needs of all local communities are satisfied.' In other words, local needs should be able to be met at the local level through the use of local resources. Studies we have funded show that while five per cent of the population is not served by any library, another forty per cent probably does not have satisfactory or adequate service available.

The second objective calls for the provision of adequate special services to special constituencies, including the unserved. That is, we must also make sure that the unique needs of special constituencies such as the blind and physically handicapped, the institutionalized, ethnic minorities, etc. are also available at the local community level.

The third objective goes beyond the local community level. It addresses the responsibility of the states in meeting user needs; the NCLIS objective reads: 'Strengthen existing statewide resources and systems.' In this way, we hope to achieve a true intergovernmental approach to service to the citizen, where the local, state, and Federal Government each assumes and shares appropriate levels of responsibility for funding and service. As one step in this process, we are conducting a two-phase management institute for state library agency personnel to help them in their development of statewide multitype library and resource-sharing programs that will fit into a national plan.

Successful implementation of our national program requires trained staff, throughout the country, and our fourth objective spells this out—to ensure basic and continuing education of personnel essential to the implementation of a national program. The Continuing Library Education Network and Exchange (CLENE), which was begun by NCLIS, is currently working on improving opportunities for continuing education and its accreditation. NCLIS also has a responsibility on the Federal level as reflected in objective five: 'Coordinate existing Federal programs for library and information service.'

Objective six addresses yet another segment of the library and information community. We have as an objective to encourage the private sector (comprising organizations which are not directly tax-supported) to become an active partner in the development of the national program. To date, we have done this by inviting representatives of the private sector to participate in our advisory committee and task force assignments, and, within the next few months, we will establish a separate task force dedicated to examining the private–public interface in greater depth.

Our seventh objective is perhaps the most difficult and certainly one of the most sensitive. It calls for the establishment of a locus of Federal responsibility charged with implementing the national network and coordinating the national program under the policy guidance of the National Commission. There is no question that a centralized locus is essential if library service on a nationwide scale is to be coherent; the problem is where and to whom to assign the responsibility.

The final objective reads: 'Plan, develop, and implement a nationwide network of library and information service.'

These eight objectives are described in considerably greater detail in our National Program Document.

Implementation of the Program

With the completion, publication and general acceptance of the National Program Document, the emphasis shifted from program development to implementation. The eight objectives, while far more specific than the ideal goal, are only the bare bones of a framework for a National Program. The Commission's continuing responsibility for many years to come will be the addition of flesh to this skeleton by promoting and steering the development of more specific, concrete objectives as studies and experience provide the necessary information, and by encouraging the allocation of appropriate resources to the task.

While the pressing need for substantial and immediate improvement in library and information services might appear to some to require a revolutionary approach, *i.e.* a grand systems design and a call for large and precipitate expenditures, practical considerations dictate the choice of an evolutionary approach. In the first place, even in the unlikely event that the money could be found, there simply is not enough information available upon which to base such a design. In the second place, technological, economic, and sociological changes are charging down upon us at paces which approach—if they have not already reached—exponential rates. By the time such a grand design could be developed, funded, executed and put in place, it would already be obsolete. Finally, such a grand design would certainly give the impression, if not the substance, of a massive, monolithic Federal presence in library and information services, which is antithetical to the political and philosophical underpinnings of the United States, and contrary to the expressed intent of the NCLIS to avoid any such authoritarian superstructure.

The evolutionary approach requires a kind of double vision. While one eye is focused on what is achieveable now or in the immediate future, the other must remain firmly fixed on the eight objectives to ensure that current activities fall within the framework and contribute to eventual attainment of the objectives. Fortunately, this is not as difficult as it might seem. At our present stage of making a beginning, there is a plethora of tasks that are both practicable and contribute to one or more of the objectives. The difficulty lies in identifying those which are 'ripe' and in selecting from among these the ones to which we will apply our limited resources.

The first requirement is that any activity must be seminal; it must either provide basic information necessary for future decisions, or it must have broad or long-range effects. The second requirement is, of course, that it must be affordable. Fortunately, the authorizing legislation for NCLIS did not strictly limit the Commission to its own appropriation. By enlisting direct and indirect support from other government agencies, from educational and professional institutions, from foundations, and from individuals, NCLIS has been able to extend its activities beyond what could be funded from its own budget, and at the same time, has obtained access to a larger body of expertise and has involved a larger community in its implementation efforts. In all of the Commission's current projects, the emphasis is on the application of existing resources in ways which further the National Program.

Commission staff

A brief review of some of the supporting studies and implementation activities will give you a sense of the intensive effort we have engaged in these past two years. Before I do that, let me explain our method of operation. The Commission staff is small. It consists of library and information professional staff of three and a support and administrative staff of four. This Autumn we expect to add two new staff members, a professional and a secretary. With a staff limited to nine (only four of whom are library and information professionals), and an equally limited budget, we have had to exercise some ingenuity and considerable restraint to get much accomplished. In the first place, our Commissioners are much more active than is normally the case. They actively develop policy, implementation strategies, research ideas, and so on. All of our task forces and project advisory committees include two or three Commissioners. When we let a major contract for a research project, we usually try to find another organization with an interest in the subject to co-sponsor and co-fund the project with us. Most frequently this other organization will be another government agency, but can be a professional society or a foundation, or someone else. However, our most effective means of obtaining broadly based support for our efforts is the establishment of task forces.

Task forces

A task force is a group of experts and specialists assembled for a series of sessions to develop recommendations for solutions to a problem. Members are selected to represent a broad spectrum of interests and to provide the expertise necessary to a realistic solution. The number of participants may vary from as few as ten to as many as twenty-five, depending upon the complexity and scope of the problem being addressed. The objective of each task force is clearly stated, a time frame and number of meetings are established, and a professional staff member is assigned to provide coordination and support. A given task force may require twenty to thirty per cent of the staff person's time. If the regular staff is fully committed, temporary part-time staff may be added to work with a task force. There have been four task forces working this year, and four more are scheduled to start up next year.

The task force on providing access to periodicals typifies this kind of operation. A study, *Resources and Bibliographic Support for a Nationwide Library Program,* funded by NCLIS provided a springboard. The conclusions and recommendations were considered by a meeting of about 40 high-level people representing all concerned constituencies over a period of several days. This meeting produced three recommendations listing action on access to periodicals as the highest priority, and a task force was formed. The task force met five times over a period of one and a half years and reviewed three drafts before agreeing to a final report. The report and its recommendations were then presented to the National Commission for acceptance of the report and for implementing action. The task force on access to periodicals and the development of a national periodicals system was dealing not only with a complex problem but one that is controversial. Just this past June the Commission adopted seven actions to start the implementation of a National Periodicals System. After careful study and consideration of what already exists, the political realities and the funding potential, it was decided to work toward a three-level system. In keeping with our philosophy, we are going to build on existing strength. In the United States there are at least six effective and well organized state and/or regional periodical systems that are funded and can provide upwards of 80 per cent of all demand. Our three-level system builds on these state and/or regional systems as a base.

We also intend to utilize the outstanding periodicals collection at research institutions, such as the Library of Congress, the National Library of Medicine the National Agricultural Library, the New York Public Library, the Universities of Illinois, California, Harvard, Yale, etc. to supply the needed periodicals for the final three to five per cent of requests in our national system. The middle or second level will be a dedicated periodicals centre (much like the British Centre at Boston Spa), eventually holding more than 50,000 titles. Funding will come at first from foundation support, supplemented by transaction fees. In three of four years, the basic support is expected to come from Federal sources, thus guaranteeing continuation and stability of funding. Transaction fees will also be a continuing source of funds.

A task force which is nearing completion of its efforts is the one on high-level computer protocols that will permit the interchange of bibliographic information among different systems by the use of a standardized interface. Appropriately enough, our co-sponsor for this task force is the National Bureau of Standards, since its product will be submitted to the American National Standards Institute and appropriate professional bodies as a proposed standard. Not surprisingly, considering the potential impact of the results, there was no difficulty in finding high-level personnel to participate in this task force. On the contrary, as soon as the charge to the task force was announced, we almost had to fight off the volunteers, and at many of the meetings, 'official observers' have equalled or outnumbered the participants. Incidentally, the springboard for this task force was the work of a committee of the Information Science and Automation Division (ISAD) of the American Library Association (ALA).

A topic which in our view has not received sufficient attention to date is the role of the school library/media centre in a national network. Therefore, we established this spring a task force to examine the needs and resources of these critical elements of the educational system and begin developing a definition of their role.

Finally, we are co-sponsoring with NSF a task force to assess the current functions of Committee Z-39 of the American National Standards Institute. Z-39 deals with library work, documentation and related publishing practices.

Its Chairman will retire next year, and this seemed like a good time to re-evaluate its activities, particularly in light of the many new demands generated by the developing technology.

Task forces projected for next year will examine such subjects as: national information policy, the respective roles and the interface between the public and private sectors, the inter-relations and impact of other national and international programs with the National Program of the United States, and the provision of access to monographs, following up the serials access study.

Let me now discuss some specifics of our recent and current activities, beginning with the research projects.

Research projects

Earlier this year we published the report of an inventory of the needs of the United States for library service. The report develops 'indicators of need' based on standards developed by the library community and compares these to present library facilities. While no new data was developed for this study (previous surveys were used), and the measurements are quantitative, rather than qualitative, it serves, nevertheless, as a valid reflection of the current status of our libraries. Indicators reported on in this study include staffing (both professional and support), collections (print and non print), acquisitions, space, operating expenditures, and hours of service. The study concluded that libraries in the US in 1975, although doubling their real operating funds since 1965, were grossly underfunded and gaps in essential resources are pervasive for public, academic and school libraries as are gaps in professional and support staff and in current acquisitions. The study suggests the library community and its clientele have a strong obligation to counter the adverse trends of 1975–76, if progress toward more adequate library service is to be restored.

Almost simultaneously with the inventory, we published the report of a study of the impact and effectiveness of Federal funding programs on public libraries. This study demonstrated quite clearly that while categorical aid programs, such as the Library Services and Construction Act (LSCA), have had a positive effect upon libraries, they are in need of refinement and improvement. On the other hand, it demonstrated just as clearly that in the competition for aid provided through such programs as General Revenue Sharing (GRS), libraries lost out almost completely, with only an infinitesimal fraction of the money being assigned to libraries, and that used to replace local funds, rather than supplement them.

Another research project, completed recently and published in January 1978, surveyed the extent of library photocopying and the characteristics of the materials copied. This study, co-sponsored by the National Science Foundation (NSF) and the National Commission on New Technological Uses of Copyrighted Work (CONTU), will be extremely valuable to everyone in the library information community in assessing the probable impact of the new Copyright Law which took effect on 1st January, 1978, and in preparing for compliance. This is the first comprehensive national study of library photocopying in the United States that included all types of libraries across the country. Major emphasis was placed on the copying of serials, most of which are scientific and technical scholarly journals, but data was collected on all materials photocopied. The intuitive conclusion that a relatively small number of titles accounted for a large proportion of the copying, at least in interlibrary loan, was confirmed. The study shows that 86 per cent of the items photocopied for interlibrary loan are from only 20 per cent of the titles. On the other hand, the intuitive conclusion that demand for serial articles tapers off rapidly within four or five years after publication was not confirmed. Nearly one-fourth of the interlibrary loan photocopies are over five years old and over one-fifth of the serial copies made for local patrons are over five years old. The results of this study are being put to immediate use by CONTU, but we expect it to be a valuable benchmark for years to come.

Currently underway are two projects in which we are working closely with the Library of Congress. The first, which is just being completed, is an attempt to define the near-term role of the Library of Congress in the National Program. The second, which is just starting, is on the role of an authority file. In a network setting—one that includes shared responsibility for cataloguing as well as sharing of resources. The question is not really the *role* of the authority file, so much as it is how one provides that function in a network setting. This is a question that not a great deal of thought has been given to, to date, and so is, in effect, breaking new ground in the area of how a network catalogue should be organized and built. The issue is so complex that the study has been divided into two parts: the first to design the methodology for the study, and the second, to design the means for implementation. The first part has just been completed, and represents an impressive intellectual effort on the part of the 'contractor' used by the Library of Congress, Edwin Buchinski of the National Library of Canada.

The last of our current research projects is being undertaken with the co-operation of the Association for Educational Communications and Technology (AECT), and is directed at defining the functional specifications of a national data base for non-print media. A team of authors has been formed that will provide a brief historical summary, survey and analyse existing nonprint media data bases for similar data elements, discuss user needs, and derive from this the kind of functions a nationwide data base of information about nonprint materials should provide. This project is scheduled for completion before the end of the year. But the operations of the NCLIS are not limited to monitoring contracts and task forces. There is a large and time-consuming body of activity which can only be labelled as 'other'. I can not possibly discuss them all, but a few examples should give you an idea.

Other activities of the NCLIS

We have been working closely with the Bureau of Indian Affairs and the Office of the Secretary of the Interior to develop a plan for a full spectrum of information services for Native Americans living on or near Indian Reservations. In August we visited some of the sites concerned to talk to the tribal leaders about their perceptions of needs for library and information services. The plan for service calls for establishment of a coordinated national and regional system, training of personnel to provide services, and on-going evaluation of progress toward the goal of meeting all levels of need of access to information by this community. These needs cover a wide range: from information on housing or vehicle repair to information on recent tribal council actions, curriculum materials, Indian culture, and grant guidelines. The plan developed by the Department of Interior is comprehensive and specific; it could easily serve as a model for other information-poor constituencies, and the Commission will continue to monitor the progress toward implementation of this project.

In addition to the two studies mentioned, we are also participating in another activity with the Library of Congress: a Network Advisory Committee was formed by the Librarian of Congress to advise him on national network development. This committee is under the auspices of the Library of Congress's Network Development Office, which is charged with developing and implementing the design of the library bibliographic component of a nationwide network.

Last summer, the Committee on the Right of Privacy of the Domestic Council (a unit of the Executive Office of the President of the United States), accepted the Commission's offer to sponsor a meeting of representatives of a variety of information constituencies to provide input to their study of National Information Policy. We organized and held the meeting for them and on 17th January, 1977 we published the report of their study, which was an examination of emerging issues of information policy and a recommendation as to how the government should organize to address these issues. Among the issues examined were the multiple consequences of the economy's growing information sector, along with specific issues such as the impact of computer and related technologies, the relationship between privacy and freedom of information, and access to information and information delivery. The recommendation was for the establishment of an Office of Information Policy in the Executive Office of the President, which would be assisted by an Interagency Council on Information Policy and an Advisory Committee representing the private sector, local government, academic, and professional disciplines.

For several years now, we have been working with CONTU, the Register of Copyrights, and some forty-odd other organizations to achieve an equitable resolution of the library photocopying problem by sponsoring or participating in dozens of conferences, meetings and discussions among various constituencies with an interest in the question. While the question may not be fully resolved yet, we do have a copyright law which recognizes the library problem and the CONTU guidelines which establish reasonable limits on library photocopying for interlibrary loan.

We are members or interested observers on a number of inter-agency committees and instrumentalities, and we have bilateral relationships with a great many other government agencies, such as the Office of Libraries and Learning Resources within the Office of Education, the National Centre for Education Statistics, The National Science Foundation, The National Endowment for the Humanities, etc.

When we were asked by the Urban Libraries Council for permission to use our contractor for the impact of Federal funds study and our data to perform a study for them, we agreed immediately. When the study was completed, we felt that its potential audience was far wider than the few hundred copies that the Council could print, so we published and distributed the report. It recommends that libraries, as educational institutions, be supported by state funds in a manner comparable to the support provided to schools.

A final illustration of our 'other' activities but by no means an end to the catalogue, is the series of management seminars for chiefs and senior personnel of the state library agencies. Since the states and the state library agencies are critical to the success of a national network in the United States, it is important that their personnel be kept abreast of the latest developments in technology and management techniques for planning, budgeting, evaluation, etc. Two national seminars have been held this year, and regional seminars are projected over the next several years.

White House Conference

One vital element in the Commission's plans for implementing the National Program is the forthcoming White House Conference on Library and Information Services. This conference has been in the making for more than fifteen years. The responsibility for planning and conducting the conference is assigned to the National Commission. The purpose as stated in Public Law 93-568, 'is to develop recommendations for the further improvement of the nation's libraries and information centres and their use by the public, in accordance with policies set forth in the preamble of this joint resolution'.

This preamble: identifies the indispensability of access to information and ideas, recognizes the pivotal role of libraries and information centres in providing that access and their need for growth and adaptation of new technology, points out the need for planning, cooperation and coordination and the NCLIS role in providing these functions and finally acknowledges the need for public understanding and support to achieve the objectives.

This law was signed by President Ford who was a sponsor when he was a Congressman and the appropriation was passed by the current Congress and signed by President Carter.

The Commission looks to the White House Conference for two major outcomes. In the first place, the fifty-seven state and territorial conferences which will precede the National Conference will provide information, which could be obtained in no other way, on the state of library and information services in each state, the needs as perceived by its citizens, and the resources which can be committed to library and information services. Secondly, the state conferences, which can have no more than one-third professional librarians or trustees as delegates, and the subsequent National Conference are expected to result in a marked increase in awareness of the value and need for library and information services among legislators, administrators, businessmen, and the general populace. All of this will constitute an invaluable plus for the national programme.

A network concept

To achieve its goal, and its mission, the National Commission has also postulated a network, but of a rather different genre than the one usually discussed. To use the phraseology of the advisory committee to the Library of Congress's Network Development Office, NCLIS's responsibility in building a network encompasses not merely the 'library bibliographic component', but the entire scope of a 'National Library and Information Service Network'. The network concept envisaged by NCLIS is a 'full-service' network, not restricted to being computer-based.

NCLIS concept, as used here, refers to a rational, coherent pattern of integrated activity among information suppliers and information seekers. Within that framework, then, there is no mandate that all activity must be computer based, nor do we see any need to issue such a mandate. Information is, and can be, transmitted in many ways, via computer is but one option. On the other hand, that framework does assume a coherent pattern of communication. That is, we believe logical channels must be identified and utilized, that the direction and flow of bibliographic data, of documents themselves, of information concerning bibliographic data, and of information itself can and must be structured if adequate service to the user is to be provided with optimal economy and efficiency through the network. In our view, this requirement for rationality applies equally to the transaction between information-seeker (*e.g.* the individual library patron) and information provider, between one library and another, laterally or hierarchically, between library and vendor or publishers or between a periodical access centre, for instance, and its users. And it applies equally whether the transaction is document delivery, or an interlibrary loan request, or a query concerning an acquisitions decision.

How will this coherent pattern be effected? The NCLIS rationale has been that this can best be done through the traditional division of responsibility between the states and the Federal Government as established in the Constitution. Locally, the states should assume the responsibility for evolving rational hierarchies for the provision of service to the constituents within their borders. Each state should define the paths along which transactions within its own borders should flow for maximum utilization of its own resources. Beyond the state level, the responsibility should be assumed by the Federal Government, *i.e.* what the states cannot provide, the Federal Government should. We are not opposed to regionalization, or to multistate organizations, provided they serve a clear and useful function. However, it is a fact that Congress is made up of representatives from fifty individual states, each of whom, for altruistic or other reasons, is concerned primarily with serving his own constituency. As a result, Federal funding has almost exclusively been allocated on a state-by-state basis, allowing each Congressman to be equally placated. To change this pattern on a national scale is a task of insurmountable difficulty. It constitutes a threat to the viability of the individual Members of Congress that I doubt they would be willing to endure. Thus, there is no viable long-range base for regional activity except as negotiated through the individual states. That is not to deny that regional mechanisms do exist and, on occasion, have proved effective but examples, like the Tennessee Valley Authority, are isolated cases. So far as I know, there is no similar authorization applicable to nationwide library regionalization.

National Periodicals System

The proposed NCLIS National Periodicals System is the first tangible effort to establish coherent information flow patterns on a nationwide basis. While many details remain to be worked out, the proposal calls for the establishment of a national periodicals access centre with defined channels of access to its services. Thus, attempts to establish coherent patterns for transaction flow are beginning. While some of the transaction patterns, particularly as they relate to utilization of the CONSER data base, would be computer-based, many others would not. The periodicals access project assumes that actual requests would arrive via the traditional modes of mail, teletype, and telephone for many years to come. However, a full-service network deals not only with serials, but also with monographs, and documents and newspapers—local, state, and Federal, and all forms of nonprint as well. It is concerned not only with the identification of bibliographic entities and their delivery, but also with their acquisition and preservation. Resource sharing is, of course, a key phrase here. The NCLIS network concept includes resource sharing through cooperative acquisitions, through document delivery systems, through broader direct patron access to resources, and through sharing of staff and facilities. NCLIS's 'full-service network' also differs from the widely held view of networks in that it covers much more than bibliographic data-based concerns. It encompasses the entire gamut of information-related activities and services implied in providing access to information to the people of the United States. It is concerned not only with the needs of libraries but also those of the rest of the information community, and with the incorporation of those needs into the planning and development, as well as delivery of services through a network.

Multitype library co-operation

The NCLIS network envisions an integration of the services of the school and special libraries, the public and academic libraries, urban as well as rural, the state and Federal libraries, the for-profit and not-for-profit, the private and the public sectors into a unified and comprehensive system of service. The key phrase here is multitype library cooperation. Full utilization of existing resources calls for increased coordinating among different types of libraries. From an objective point of view, it is no longer defensible to duplicate collections because the funding base for two nearby libraries is different. We cannot afford that kind of redundancy. A truly integrated service network will allow normalization of such collections and provide improved coverage to the constituents of both institutions.

Special libraries

We are also concerned with meeting the special needs of special constituencies, the needs unique to the deaf, the blind, and the physically handicapped; the special requirements of the Native Americans, the ethnic minorities, the aged, the very young, and remote rural populations. The concept of the NCLIS full-service network includes provision of services to these people through integrated activity and rational patterns of communication as well.

And the NCLIS network, as I indicated before, is not restricted to computer-based communication or technology. It utilizes all means of communication from mail, delivery truck, telephone, and teletype to cable, satellite, and videodisc.

NCLIS sees its role as being responsible for the provision of access to information, wherever located and in whatever form through coherent and rational communication paths. This, then, forms the basis of a network which, through integrated and cooperative activity, encompasses all of the services which lead to the provision of information to those who seek it. And it is, ultimately, the information seeker, be he or she user or nonuser, who is NCLIS's primary concern. Our goal, our mission, is to meet his or her needs; the techniques, mechanisms, and strategies are but means to an end.

Conclusion

The NCLIS network is not yet, of course, a reality. It will take many years until all the pieces can be effectively put together. We are working on as many pieces as we can within the limits of our time, budget, and staff. Equally important, however, is a positive attitude, a feeling of confidence and a form of commitment. Realization of our goal, is, in my view, dependent on our continuing sensitivity to the political process and a major effort to raise the consciousness of government at all levels to the fact that library and information services are essential to achieve national goals and must be given their rightful priority in the determination of funding levels. We can resolve our problems be they technological, organizational or managerial if we are willing to make the difficult and often unpopular decisions and take the necessary risks that go with leadership responsibility. We must not permit the fear of disagreement or controversy to deter us from action. We must seek consensus and strong support from the library and information community in reaching our goal of equal opportunity of access for all who desire it.

The Canadian mosaic—planning for shared partnership in a national network

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Introduction

ORIGINALLY, I ASSUMED my role at this meeting was to provide an observation on the Ontario library network. When I was asked to broaden this perspective to the Canadian scene, I was somewhat hesitant. I have neither the national position nor the national authority that Alphonso Trezza commands. Whilst I was relieved to discover that I was expected to consider 'not what existed' but 'what was needed to be done'—the additional phrase 'from the national point of view', hardly encouraged an enthusiastic response. It merely confirmed my view that there are very few people who understand a Canadian's dilemma.

I remember recently reading the autobiography of Thomas Raddall. He remarked that at the time of the American revolution, roughly two-thirds of the people living in Nova Scotia were of Yankee origin and their sympathies were naturally with their own people living in New England. However, their existence depended on the coast and the coastal valleys of the Maritimes rather than the deeper Hinterland. So long as the coast was dominated by the Kings Forces they were wiser to remain neutral. As he remarked, 'they were pinned to the coast like a pelt to the barn door and the result of their reluctance to commit themselves one way or the other was persecution by both sides. A time came when their American brethren harassed them beyond endurance and they turned dourly to the King'.

Undoubtedly, a friendly co-existence now exists along the 5,000 mile border with the States but when 20 million people live beside 200 million, it takes unique diplomacy to establish and maintain national identity in face of economic domination. England, needless to say, saw Canada only as a source of raw material, and America as the market outlet for finished products. America, of course, sees Canada as a prime source for raw materials and a minor addendum to American market outlets. Even the Canadian library and information world must accept and live with this economic domination; thus Canadian library schools seek accreditation from the American Library Association, whilst individual Canadian libraries and librarians participate as active members in

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meetings of both the American Library Association chapters and the Association of Research Libraries. It says well for the Americans that they accept and encourage this participation but needless to say, it does not aid the economic and professional well being of the Canadian national organizations.

There is a further factor to consider when requesting Canadian speakers to outline the Canadian scene. Canada has the second largest land mass in the world, 3,851,839 square miles, yet its population is 20 million. Put another way, Ontario, one of the wealthiest of the Provinces, is three and a quarter times the size of the British Isles and yet it has only the population of Greater London. Not surprisingly, when a population is as scattered as this, it is not easy for any person to offer an objective view of the whole. Of course, that population is not so scattered. It occupies a narrow belt, 300 miles wide and 5,000 miles long—with almost half living in one Province—Ontario! In fact, half the publishers and half the library resources of Canada are to be found in Ontario. Under these circumstances, to ask a Torontonian to speak for Canada could undoubtedly lead to his pelt becoming nailed to the barn door on his return—especially, if he has to pass through Quebec and Ottawa and also comes from the University of Toronto Library, one of the largest research libraries on the American continent.

Whilst I am sure that the media in both England and the States, if it ever addressess the problems of Canada, stresses the issues of the French Canadian, rarely will it indicate a unique difference between the two North American States. The vast areas of Canada has created a cultural mosaic. Whilst the urban areas in the States created a melting pot for the immigrants, in Canada immigrants were swallowed up by the land mass, and often separated by inhospitable regions. They remained distinctive ethnic groups never completely assimilated by others but nevertheless, modifying, and even abandoning customs according to the nature of their new environment; an environment as diverse as the people.

What has this to do with library and information networks? Communication. Simply stated, Canada is a miniature United Nations. It lacks neither talent nor ability but it has to face squarely the influence that mitigate against human relationships—language—distance—environment. Whilst the heavily populated areas of England and the States have similar problems, their very mass of humanity tends to mask the human problems of communication until corruption or suffering is demonstrated on such a vast scale that the problem can no longer be overlooked.

Diversity has enabled the Canadian to examine and discuss the best and the worst of British and American practices through a common language—English. (I say English, as the language for business, research, and industry in a multilingual setting). This was probably forced on them because they had to learn by reading British and American textbooks. The stark arrogance of these texts in particular for world geography, history, and cultural affairs provided ample opportunity for the real enquiring mind to question the role of these national paragons of power! Certainly, the Canadian environment provided an opportunity for intellectual stimuli but only recently has it found expression and fulfilment inside the Country.

Canada Institute for Scientific and Technical Information

Perhaps, one of the causes of this stimuli has been the role of what is now the Canada Institute for Scientific and Technical Information (CISTI). Whilst this organization was founded in 1974 as a Division of the National Research Council for Canada, it was created by the merger of the National Science Library, which had been inexistence since 1924, and the Technical Information service formed in 1945.. CISTI appears to be a highly successful central node in an evolving Canadian scientific and technical information network, maintaining an interface with various types of end users and reinforcing the service capabilities of other Canadian libraries and information centres. Certainly, as a National organizer, it has created a great deal of respect from within and without Canada. To a certain extent, its parent organization established this base. The NRC has had a major role in scientific communication for many years and its support to researchers in the country has stimulated some widely acclaimed advances.

The headquarters of CISTI, a building costing $14,870,000 was occupied in 1974. Whilst its resources are only one million volumes with a current serial title list of 18,500, its importance rests on its retrospective and alerting information service, all of which are computer based. The Canadian On-Line Enquiry System (CAN/OLE) has been in operation since March 1974 and was designed to provide retrospective searching of large bibliographic files in all major fields of science and technology. As in the early days in the development of the British Library—the social sciences were excluded. By 1976, CAN/OLE had over 4 million references which could be accessed across Canada through 240 terminals. The data bases that are made available include Biological Abstracts, Chemical Abstracts, Engineering Index and Inspec.

However, there are two unique bases that are incorporated in the system which are of some consequence to the end user. CISTI maintains on-line a Union list of Scientific Serials in Canadian libraries. This means that a user after carrying out a subject search can ascertain the location of any journal reference by a further search on the same terminal. Then, by dialing four digits, it is possible to create an interlibrary loan request with CISTI for the specific title required. This service also extends to Conference Papers held by CISTI.

Another unique base is the Canadian version of the Smithsonian's Science Information Exchange. According to the Federal Government Cabinet mandate, the 31 grant-giving agencies of the Federal Government must supply CISTI with a fact sheet of each research award given to academic institutions, including fiscal data, and project abstract. This file contains 10,000 new entries annually, plus approximately 30,000 project descriptions referring back to the last three years. The file is not so much a bibliographic tool but a directory of subject expertise. A user pays $40 per connect hour, to utilize CAN/OLE.

The Canadian Selective Dissemination of Information System is more widely known because it became an internationally utilized mode of service within the UNESCO/UNISIST programme. In fact, CISTI has and is aiding many UNESCO members to establish national SDI systems modelled after CAN/SDI —Australia, South Africa, Argentina, the Netherlands, India, Mexico, and the United Kingdom to name just a few! The system provides some 2,100 subscribers with a personalized bibliographic search of fifteen data bases which includes the Library of Congress Marc tapes. The system operates in batch mode. The production of the profile is carried out by a mixture of experts because the production of personalized profiles requires considerable awareness of user needs and the data base potential. These may include personnel such as the University of Toronto Library staff who help users explore the date bases on CAN/OLE, or through specialist agencies such as the Canada Centre for Mineral and Energy Technology for users in the mining technology and mineral sciences. The basic charge for this service is $40 per annum.

The third on-line package offered by CISTI covers medical information and is received directly from the National Library of Medicine in the States. It includes Medline, Taxline, Chemline, Catline, and other smaller files. In a bilateral agreement, CISTI provides the funds to cover the cost of indexed input into Medline which is a Canadian responsibility in the quid-pro-quo arrangement. There are now 37 Canadian Medline centres in 16 medical schools, government and industrial research organizations and in the CISTI Health Sciences Resource Centre. Apart from on-line facility, CISTI offers SDI services in batch mode for 93 Canadian medical researchers. The charge for Medline is $28 per connect hour which includes communication charges through the Telenet and Tymshare materials.

All of these systems are available off line by telephone, telex, letter or personal visit although a fee of $20 per question is levied to cover either manual or mechanized retrospective search.

How can we measure the success and importance of CISTI as a central node in a scientific and technical information network? CISTI continuously monitors users reactions, and, as most of its services cost money, is able to indicate that continued subscription indicates user satisfaction.

Undoubtedly, CISTI enjoys a privileged position. In Canada, the Federal Government is responsible for external affairs. This means the establishment of a unified policy embracing ten provinces and the northern territories. One aspect of this policy is the establishment of a strong bulwark against the economic pressure of the States. It must be remembered that foreign investment in Canada has been to remove its natural resources, not to process and develop products. The companies involved were mainly British or American and their expertise remained firmly under the control of their head offices outside Canada. This not only limited Canadian development but encouraged Canadians with skill potential to go outside the Country for their professional and technical advancement. The Federal Government had the task of creating a national policy which would stimulate research, develop centres of excellence and encourage local industry.

Towards a communication network

However, as a glance at a map demonstrates, North American topography is north/south rather than east/west. Couple this with the market value of a population of 200 million versus that of 20 million, and it is easy to appreciate that private investors are sceptical of investment in manufacturing industries in the smaller market. It was left to the Federal Government to provide the stimulant. Unfortunately, financial grants for this purpose however well meaning provide opportunity for the foolhardy as well as for the innovator. Success was almost an affair of chance. Certainly, the risk can be lessened by technical know-how especially if it is related to the local environment. The scarcer the know-how, the more important the communication requirement. In Canada, the centres of excellence are few and far between; bibliographic resources scattered, and mainly in public hands. Thus, the development of specialist centres where experts could study Canadian environmental problems and communicate technical know-how through an information network was of paramount importance to the well-being of the nation.

The services that the National Research Council developed which made CISTI the central node in the network are the direct result of that cabinet policy. So too is the concept that the communication network, which provides the vehicle for information exchange, should be available on an equalized rate basis so that access on-line costs the same across the whole country. On the whole, CISTI provides a whole range of conventional library services free of charge. However, its computer based services are partially cost recoverable. CISTI does not retrieve the cost of data base storage, file maintenance and staff salaries. Users are generally charged processing costs, stationary, postage and royalties—in other words, CISTI absorbs the fixed costs; the user pays the variable costs.

The University of Toronto Library uses these services and also offers terminal facility to other organizations who subscribe to Institutional Membership of the Library. Whilst I am aware of the use of the service, I am also aware of its cost in staff time, connect time, and loan facility. It is still difficult for a library to measure the cost effectiveness of such service. Certainly, it is faster than a manual search.

Perhaps, it is unfair to add one note of caution but in the North American political scene, there is a belief that the government should use private enterprise whenever possible. Certainly, if a system once developed is commercially viable, then private enterprise assumes the right to demonstrate that they can do it more efficiently than the government. Many projects have disappeared from the private sector because politicians have seized this excuse to axe their development.

Thus, CISTI must use commercial computing centres. Indeed, it is always a source of interest to see how often IBM equipment is used for government sponsored projects. In some areas, CISTI is already in competition with commercial systems such as Lockhead. Thus, some of CISTI services are in the firing line. However, the innovative nature of the staff to create an on-line interlibrary loan system for journals and Conference Papers; to ensure Canadian bibliographic content and to ensure that the whole system is bi-lingual has enabled the service to continue. Now that it is firmly acting as the back-up source to sixteen field offices of the Technical Information Service, perhaps, the axe will continue to be held in abeyance. But abeyance is the operative term.

CISTI, then, is an example of what can be achieved when it is not only left to the Federal Government for action but is sufficiently important a task for the cabinet to define policy. The National Library of Canada and the more general library bibliographic network is not in a privileged category. Academic and public libraries are seen by Governments as cultural and recreational appendages. However much libraries may see their role in an information network, government perception is that they are supportive and secondary to the main streams of education and trade. When government committees are led by technologists, or even scientists, then, the humanities get very short shrift!

National Library of Canada

In a federal state, their situation is even more shaky. The provinces have responsibility for public, school, college and university libraries, although funds for the latter are aided indirectly by federal academic grants. The National Library of Canada is fully supported by the Federal Government and has direct responsibility for the receipt, purchase, maintenance, preservation and bibliographic recording of the Nation's publications in whatever form that may be issued—print, audio-visual, tape, etc. The National Library must also provide the framework for interlibrary loan on a national basis. This type of situation invariably places the National Librarian in a difficult role. If the National Librarian becomes too sensitive to the local issues, then, little can be achieved. Innovation at a national library creates grave ripples in the nation's library service. No doubt, for these reasons, governments are sensitive to the choice of a National Librarian so that political rather than professional criteria takes priority.

Influence of the Library of Congress

The role of the Canadian National Library is further bedevilled by the professional dominance of the Library of Congress. It is difficult standing on this side of the Atlantic, to fully appreciate the professional impact that the Library of Congress has had on the whole American continent especially through the mechanical reproduction of catalogue cards. The technique of mass production was perhaps more acceptable to Americans. Certainly, financially, managers were willing to accept standardization to cut operational costs rather than examine the ultimate costs of the service to the user. However, as the library user does not perceive the payment for services, it is left to those who actually pay the bill to call the play.

In this instance, a whole generation of librarians in both Canada and the States have been professionally trained to accept Library of Congress internal requirements for classification, place location, subject heading, bibliographic control, and filing arrangement. In fairness, it was a surprise to the Library of Congress that this should happen. It is also remarkable that they have continued to try to meet the obligations that this leadership role has carried with it—even if it was thrust upon their unwilling shoulders. Nevertheless, it has made the role of change even more difficult for the library manager to implement.

This leadership role continued with the introduction of the computer when the establishment of the Marc communication format provided opportunities for further innovation. However, whilst the Library of Congress provided leadership in general bibliography, the roles of the National Library of Medicine and the National Library of Agriculture were equally important. The role of the NLM was particularly significant. Its political strength was such that differences in practice and, indeed in direction could be pursued without interference. Subsequently, the problem of common partnership between LC, NLM, and NLA in bibliography has taxed the ingenuity of many committees, and confounded many users.

However, there was one common denominator—IBM. It is as well to remember that the IBM generation of computers were designed for batch computing. When The Ohio College Library Centre (OCLC) and the University of Toronto were looking to the development of an on-line library network, both chose from a newer generation of computers designed specifically to meet on-line requirements. These basic facts are important to an awareness of current Canadian developments.

Computerized services

Over the years, the National Librarian of Canada has sought to discover the type of national library service that the Canadian librarians believe is necessary for the country. Whilst listening to them, he has had to watch the progress of the Library of Congress and ensure that his services dovetail rather than duplicate what they offer. Meanwhile, he has a responsibility that is unusual to a National Library—his library must be staffed, operated and all services offered in a *bilingual* mode. I like to think that for these reasons, the National Library must be excused for having missed the opportunity to initiate an effective machine-based library network for resource sharing.

It certainly has not been for lack of advice—more likely from a surfeit of advice! Even now there are two major studies in progress, one on the role of the National Library of Canada, and one to review the present situation concerning computerized bibliographic centres in Canada. The latter is to report with specific relevance to:

1. 'the plans of major existing and emerging computerized bibliographic centres and associated service organizations in Canada, for instance UTLAS (University of Toronto Library Automation Systems); Ontario Universities' Library Cooperative System (OUCLS) including UNICAT/TELECAT: National Library of Canada; National Research Council of Canada and emerging centres elsewhere, *e.g.* in the Atlantic Provinces;
2. relevant computerized library network services available as planned to be available in Canada, for instance the services of Ohio College Library Centres (OCLC) and Blackwell North America Inc;
3. the most effective means of promoting desirable Canadian computerized library network development, including the development of a cooperative national union catalogue/national bibliographic data base system making use of a network of national and regional computerized bibliographic centres and their computer-readable data bases!'

This is an ambitious study which I am sure will prove to be significant to all those involved in network development. One particular aspect of the report which is becoming increasingly important to library managers is the sub-study which will study compatability problems.

Bibliographic centres

A 'Bibliographic Centre' has been defined in the report as 'an organization offering to a number of libraries computer-based support for technical and public service operation'. Examples of bibliographic centres are: the computer operation portions of the University of Toronto Library Automation Systems (UTLAS), of the National Research Council of Canada (*e.g.* Canadian On-Line Enquiry—CAN/OLE—service), and of Ohio College Library Centre (OCLC). The computer-based information services offered by Lockhead Information Systems and System Development Corporation of California (SDC) also lie within the definition. In the study, attention will be focused on centres with the following characteristics:

(a) centres maintaining or planning to maintain data bases pertinent to a Canadian national union catalogue/national bibliographic data system,
(b) centres with services used by many Canadian libraries,
(c) centres in Canada,
(d) centres offering services which Canadian libraries may use, even though no (or few) Canadian libraries presently use these services!

The importance of the Bibliographic Centre arose out of a report issued by the National Librarian's Canadian Union Catalogue Task Force Group. It took four years of detailed study for the Chief Librarians involved to produce their recommendations in May 1976. The pertinent recommendations were:

(i) that the National Library of Canada establish and coordinate a Canadian Union Catalogue system, in cooperation with provincial/regional library systems,
(ii) that this system consists of a national bibliographic centre at the National Library of Canada and a number of provincial/regional bibliographic centres,
(iii) that these provincial/regional bibliographic centres in as much as they are part of the Canadian Union Catalogue System, have the capacity to record and provide information about holdings as agreed with and arranged by the National Library,
(iv) that these provincial/regional bibliographic centres may also provide various cataloguing support services and other services as agreed and arranged within the provinces regions concerned.

The question that most people now ask is whether waiting for yet another survey will aid the Canadian library network. Many feel that its pages will join predecessors in the clinical cleanliness of the library archives. However, how far can we anticipate innovative leadership from our national libraries when they must rely on the fickleness of governments for support? In this regard, I ask myself whether PRECIS could have been developed by the British Library. Certainly, the National Library of Canada could not adopt PRECIS though it was a recommendation of the Canadian Marc Task Force in 1972. At that time it was an innovative technique which may have substantially modified library practice—but it required capital investment with no immediate cost recovery. Could OCLC with its innovative approach to the use of on-line techniques for shared cataloguing have been launched by the Library of Congress? Perhaps. But had it been operated on anything other than the Sigma or its equivalent, it probably would have set back on-line library networks by several years!

University of Toronto Library Automation Systems

On the Canadian scene, the role of UTLAS (the University of Toronto Library Automation Systems) in the development of a Canadian Library computerized network is now an established fact. Whether this is as it should be is open to discussion. However, its system development is unique and potentially of great value to on-line library system development.

The University of Toronto Library first became involved in computerized services in 1963 when the Ontario New Universities Library Project was established to select, acquire, and catalogue materials for five new campuses in the province. An automation system was designed to be as flexible as possible in record format, access, and product. It was implemented in 1965. This development led the University of Toronto to participate in the Library of Congress Marc Project in 1966–7. By 1968, the extent of UTL automated operational development was so great that a computer dedicated solely to library functions, funded and operated under the library budget was recommended and approved by the University Administration. During 1969 and 1970, installation and development work was pursued to provide bibliographic and inventory control in the library. By 1970, the system was providing computer printed catalogue cards from Marc tapes for external users.

In this period, it became clear that the Library had involved itself in a major undertaking in which the capital investment risk was substantial. The need for management skills in operation of the unit became abundantly clear in 1971. A nationally prominent computer systems and management consulting firm reviewed the Library's attainment and recommended that at the level of library investment ($1 million per annum) the unit should be arranged to expand its external services and look towards the creation of the library automation unit on a cost recoverable basis. One provision, which as it happens with hindsight is particularly important, was the recommendation that before separate budgets were established, the needs of the library should be studied to ensure that in the creation of wider provincial and national services the University of Toronto Library operational requirements would still be met.

Financially, separation was effected but not until 1975–6. Now UTLAS is a self-supporting division of the Library. Its Director is an executive who reports like the Associate Librarians to the Chief Librarian. Unfortunately, this development did not incorporate a study of UTL operational requirements and the University of Toronto Library is now in the vulnerable position of contracting with a division for automated services which it hopes will meet its needs although UTL is only one amongst a number of users!

The design requirements for the system recognized a basic operational need not realized by OCLC. That is, the fundamental need for each user library to define and administer its records according to its own requirements, and to facilitate the integration of the products of the service into its own existing catalogue service. The system had to pinpoint a record wherever it existed but then allow that record to be adapted for any file performing an operational function. The key to this system was to be a simplified index which would not only indicate that a similar record existed elsewhere but enable the user to consult and copy the record, if necessary, into his own operational file. UTL left it to the corporate organizations using the service to reach agreement on the appropriate utilization of each others' records. The system could respond and either monitor use or ensure that an individual record remained either transparent or obscured from others, according to the wish of the record's originator.

By 1971, the system potential was visible but unfortunately, a number of technical computer problems almost led to its demise. Nevertheless, services were provided to the College Bibliocentre, a processing centre for 19 Colleges of Applied Technology. Parallel to this operation, Ontario universities pressed the ministers for a grant to create a union file on the system through shared cataloguing. They believed that only one record should be held in the file to keep storage and operating costs to the minimum. However, there were those that saw problems in this proposal. A Union File needed standardization input.

The project members of the Ontario/Quebec library consortium (now known as UNICAT/TELECAT) saw the need and established the standards. However, in a large library system, it is not easy to change practices—it is less possible when the library had already put its records into machine-readable form to meet its own standards of input. That was the position of the University of Toronto Library—just over 1 million records in machine-readable format which did not conform to the recommendations of the consortium. After an investment that had made the system possible for others to use, this was perhaps the unkindest cut of all! However, UTL participated in the Union File project and agreed to maintain the standards of input proposed by the consortium.

At the last moment, the initial consortium had an unexpected request. A group of Quebec university libraries wanted to participate immediately in the system. This is a good example of power politics. The Quebec universities were in a difficult political situation. The Quebec government was proposing to create a computerized bibliographic centre. The universities saw this as a further step in government control. They needed involvement in another system. OCLC could neither offer immediate service nor the flexibility they needed in a French environment. UTLAS could meet these requirements and, in agreeing to provide bilingual instruction within the context of an experimental cooperative English–French Union File, the Quebec government could hardly stop their involvement. The project involving six Ontario universities and two Quebec universities was promptly put into operation.

Whilst it was a highly successful venture in cooperative endeavour, which has subsequently grown to include most universities in Ontario and Quebec, it also demonstrated what some members of the University of Toronto Library and the College Bibliocentre suspected. The system was still in its development stage and the computer resources to meet operational requirements were still far from satisfactory. The result for those users who were looking at the system to meet their immediate library operational needs was distressing. It was in fact eighteen months before the system responded adequately. Now its downtime is about 3 per cent with an instantaneous response to a spread of users from the Pacific to Quebec. However, for those involved in the initial project, the frequent downtime and inability of the system to meet operational needs led to a clamour to remove the unit from the University of Toronto Library, and, when this appeared improbable, to look for an alternative system.

The issue became more complicated by the decision of Rank Xerox to withdraw their investment in their computer division. The sceptics had a field day. As it happens, their assumption that the Sigma would be rendered obsolete were unfounded. Nevertheless, at that time, the pressure to seek an alternative system became a matter of high priority. The discovery by some members of the group of the existence of Dobis was considered by some almost providential. A computer system designed for a range of library operations using IBM hardware! However, there was a catch, it was designed for use with German Marc, and at that time, could only be marketed by one library in each country. The UNICAT/TELECAT group opened immediate negotiation which persuaded the National Library of Canada that they had to investigate the potential of the system. As the system was commercially available, the National Library of Canada could not have ignored such an investigation. UNICAT/TELECAT, only too pleased to find that any risk capital would now involve the National Library rather than themselves, gracefully agreed to participate in the deliberations but waive any rights on Canadian distribution of the system.

Meanwhile, UTLAS was overcoming its system problems and beginning to meet its user deadlines. Two significant developments now occurred. The College Bibliocentre (CB) since 1969 had been developing a machine-readable bibliographic data base of all the material it had processed for the Colleges. This included audio-visual material. This file of data had been compiled from Marc tapes, OCR input, and paper tape. When UTLAS created its system, it had established a unique format into which American, Canadian, and British Marc formats could be converted. However, UTLAS had never converted any major file. The CB file at the time comprised a retrospective collection of over 250,000 records. UTLAS had to convert this file. In so doing, they gathered the experience necessary to carry out the next major conversion—the UTL file of 1 million retrospective bibliographic records input in their earlier machine format. Needless to say, CB was not aware at that time of the difficulties involved in the conversion of their file. It was not until several months of agonizing operational uncertainty that the CB file became usable.

UTL was the next on the list but UTL was also at the limits of its investment. It was time to make the decision that others were planning but unable to reach—to close their library card catalogues and replace them with COM catalogues. Closing card catalogues in the North American context was felt by some professionals to be the equivalent of provessional suicide. The exercise took eighteen months of complex planning to put into effect. We now issue our catalogue on roll film and fiche to over 78 sites in the University campus. The main edition is maintained on a bi-monthly fiche supplement. We are just in the process of creating the 2nd edition which will include nearly 1.3 million titles. The cost of this edition to maintain 13 ROM rollfilm stations (each station includes Author, Title, Subject indices on 700 ft. rolls of film) and 78 microfiche stations updated with 6 bi-monthly microfiche supplements, will be $147,000 in this current financial year.

The conversion of UTL and CB records has increased the potential value of the system offered by UTLAS to other libraries because the bibliographic data bank is so extensive. Briefly, UTLAS provide libraries with the opportunity to:

1. build and maintain individual or cooperative group files of bibliographic records;
2. derive catalogue products in the form of stream sorted catalogue cards, booklists COM micromedia.

Access to files and ordering of products is via an on-line telephone network using the UTLAS CATSS (Catalogue Support System) processor. Using this facility, individual libraries and library groups can make mutual arrangements by which one library may have access to other libraries' files for display and derivation of records from other libraries, both current and retrospective, with no risk to the latter's file integrity. Access to the full cumulative LC and CAN MARC record bases is also currently available.

There were, needless to say, a number of experimental and operational automatic systems across Canada, mainly in academic and book processing centres. Some of these systems have provided services for other users. Notable examples would be TESA (Technical Services Automation) at the University of Saskatoon which is also used by the University of Calgary. The Université du Québec a Montreal created BADADUQ—Banque de données à accèss direct de l'Université du Québec which also uses on-line techniques. However, by and large, most of the proposals for networks have followed broadly geographic patterns—the Prairies and the Atlantic Provinces and most have been frustrated by the committees, task forces, and official organizations that have been involved in the process.

UTL with an innovative group of specialists in library and computer techniques and adequate funding created UTLAS. UTLAS service has grown into a wide network—some would say a simple case of action versus talk. However, now that proof exists of the capability of the system linked by telephone lines to respond quickly and efficiently to a shared need, perhaps it is time to review the next step in a national network.

Future developments

What UTL has demonstrated is that there is a long way to go from research through development to operation in the creation of a viable computerized national library network; that investment in a computerized system is substantial; that libraries have different system priorities which affect investment return. Because investment is high, the fund allocators press for cost recovery as soon as a system is operationally viable. In developing similar systems, the pressure for cost recovery could lead the computer manager, or director, of the resource, to optimize a system to the disadvantage of the individual user who seeks for flexibility to meet his in-house operational requirements. There would be a greater risk attached if the resource users were involved for advice in developments. What might be perceived as economically viable for the computer might prove to be unsatisfactory to meet the needs of the end user. Because of human frailty, this situation can be made worse by those who prefer the power that national, rather than local, obligations often inspire.

The pressures, the perception of need, the operational load requirements, the system development of priorities for users and UTLAS alike are changing continuously. The creation of an automated circulation system had equal priority in UTL with the development of catalogue support. The system is still not operational. Authority files in a shared catalogue system would do much to alleviate the problem of standardization of entry. UTLAS has PRECIS on line—a system which could be extended easily to provide authority file structure but if this does not conform to the developments of the NLC and the LC, then it is wiser for UTLAS to maintain that authority files must await the next stage of system extension. This is not a criticism of UTLAS but an indication that when the national centre is unable to provide a strong system leadership, local libraries, areas, and regions seek their own solution within the limits of their expertise, finance and priorities. Then, when cost recovery is necessary, individual library system requirements even if they have wider potential, become low in priority compared to the extension of the initial system to a multitude of users for cost recovery.

Perhaps this is what it should be. Certainly, users' reactions are of interest. UTL has purchased its own mini-computer as part of the development for an automated circulation system. Whilst UTLAS main frame will continue to house UTL full bibliographic records, the mini will contain mini records updated weekly. UTL is beginning to visualize an extension of in-house mini computers for record processing and manipulation using the main frame for sharing record input and the production of large scale products such as the COM catalogue. Initial experience with an on-line query system for public use has awakened interest in this as a possible alternative to the bi-monthly updating of the COM.

Other Ontario users are beginning to see the advantages of discussing their needs in the context of similar operational requirements. Thus, union files for the public libraries, the school libraries, the universities and the colleges are more likely than they were three years ago! This is particularly important for the smaller users who may find membership in a consortium a cost effective approach to meet their requirements. It also provides a better opportunity for examining and establishing cost recovery procedures which are necessary to encourage shared record input.

The National Library is beginning to appreciate the possible value of the UTLAS directory or index as the basis for a Canadian Union File. Whether the bibliographers at the National Library have yet understood that national bibliography can and should be developed by sharing input on line with all libraries that have unique material without editing at the National Library is still not clear. This possibility will become more apparent with the advent of on-line authority files to control input requirements. Of course, no National Library has yet grasped that a truly inter-active bibliographic network should incorporate publishers and booksellers.

Regional users such as the British Columbia group are beginning to set a pattern for creation of provincial or regional bibliographic centres. In this instance, the Provincial Government had provided active encouragement towards cooperative and coordinative library action. A Catalogue Action Group is busy planning and overseeing grant proposals which will lead to the creation of a provincial union catalogue. UTLAS will provide through CATSS the opportunity to share cataloguing in the creation of the file. However, the local group visualizes very active use of their own computers linked with the main frame at Toronto. Meanwhile, some of the libraries already possess their own mini-computers for in-house operational requirements. No doubt these, like the mini at the UTL, can be updated from the main frame at Toronto.

It is still too early to judge whether UTLAS, in leading the way towards a Canadian national library automated network, has committed its computer resources too heavily (it has three computers and a mini). In the long run it is relying on individual libraries and user consortiums to relate to the main frame with their own mini computers.

Nevertheless, a library manager cannot help but question the risks of network monopoly. The cost of processing and controlling and using a library collection is now quadruple the average cost of the item. The library manager must hold these costs to a minimum. In a monopolized network will this be possible? A library is no different from any other organization, its success depends on staff initiative. Will a monopolized network stifle local innovative skills? After all, competition need not be wasteful in duplicated effort any more than bigness need always be considered as leading to cost effective operations.

Perhaps, we should take heart from the example set by the banking industry, where the deployment of terminal interfaces with a computer system designed to meet the needs of competitive banking organizations appears to operate to the benefit of the users.

Conclusions

I have tried to be both frank and realistic in my very personal observation of the Canadian scene. I hope my comments will not be interpreted as deriding or belittling those involved. The Canadian on-line library network stretches four thousand miles with four hours difference and performs in two languages. We have advanced further than most in creating a shared input whilst keeping control over individual files. That achievement has indicated not only how much further we still have to travel but that very few of us are staffed and equipped to respond to the change in attitude and operation that on-line sharing imposes over those involved in application, management, and collaboration. As Edmund Burke wrote, 'to innovate is not to reform'. The computer may be an innovation but it strikes at the North American library doctrines and practices. It is no easy matter for large libraries to respond quickly to this challenge.

As service organizations, libraries must still meet the needs of their individual users. On the one hand, the computer offers us flexibility to meet these individual needs and, on the other hand, exposes us to the power technocrat. To make the most of flexibility, we need to encourage our colleagues to appreciate that network standards call for emphasis on indexing techniques rather than cataloguing; on the application of codes for retrieval with the emphasis on relevance to the user rather than on classification for shelf arrangement. We may share a common language—bibliographic data—but we need to interpret and possibly apply that language differently in the humanities than in the sciences, in schools than in college libraries, in public than in industrial libraries. There *is* strength in diversity.

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Research at ASLIB 1959–1977

Peter J. Taylor

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London

Introduction

IN BEGINNING ITS WORK at the end of the 1950s, the Aslib Research and Development Department inevitably faced the task of identifying the most significant problems for investigation, at the same time having the need to establish appropriate experimental techniques. Most of the projects undertaken since that time have dealt with current problems, and to an extent the advent of new technologies and techniques to the information world (mechanization in the 'sixties, management studies in the early 'seventies, on-line working and publication problems in more recent years) is reflected in the work reported below. What follows is a complete bibliography of publications by members of the Department from its formation up to the end of 1977.

In 1966 the Government's Office for Scientific and Technical Information offered to increase its support for Aslib specifically to encourage it to build up a viable research department, to undertake systematic programmes of research into scientific and technical information systems, and to provide consultancy services in this field. In response to an appeal from Lord Kings Norton, then President of Aslib, some twenty member organizations agreed to share with OSTI the cost of this new development during its first three years. Since then the pattern of grant support has changed several times, and the amount and range of work available to the Department has increased. The present bibliography provides the most up-to-date record of projects and papers completed; those interested in more detailed accounts of the activities of the Department and its policies, however, are recommedned to items 3, 52, 69, 71, 88, 106, 124, 146, 147, 148, 165, 186 below, and to the Annual Reports of Aslib.

The bibliography reveals little of the work of the Aslib Consultancy Department, which over the past eleven years has carried out over a hundred projects for a wide range of organizations. Some of these projects have been research-oriented, and have led to the production of published reports or papers (see items 93, 107, 178, 192, 206, 222 below). The majority, however, are concerned with the specific problems of individual client organizations, and the reports are confidential. Client organizations have included government departments (*e.g.* Department of Education and Science, Department of the Environment, Foreign and Commonwealth Office); national organizations (*e.g.* Post Office, British Broadcasting Corporation, British Institute of Management); international organizations (*e.g.* Commission of the European Communities, UNESCO, International Labour Office, Organization for Economic Co-operation and Development) and private industry.

It is hoped that the bibliography will help readers in reviewing the work of

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the Research and Development Department, and perhaps bring to their attention reports of research undertaken which may have a bearing on their individual concerns. Discussing the role of the Department in 1974, John Martyn suggested that 'over the years, experience has shown that the majority of research findings in information work, whether produced by ourselves or by other workers, is seldom of direct and immediately perceptible benefit to the individual information worker in the field, and the results of research can rarely be applied without modification to the solution of everyday problems. This observation, which in fact is applicable to much research in fields other than our own, is a natural consequence of the relative uniqueness of any specific set of operational problems. What we believe Aslib research has done, and will continue to do, is to have an effect on the environment of information work, by improving and enhancing the services and tools available to the practitioner, by seeking greater understanding of information users, and by providing data and results which contribute to the formulation of national and international policies whose implementation will affect the total picture of information provision'.

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The information service at the Institute of Offshore Engineering

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Introduction

THE INSTITUTE OF OFFSHORE ENGINEERING, IOE, was founded at Heriot-Watt University in Edinburgh in 1972 and from the start the provision of information has been one of its main activities. The first Information Officer was appointed in 1973, at the same time as the first engineers and clerical staff.

The Institute was set up with a generous grant from the Wolfson Foundation to act as a focal point for marine technology research, operating between industry and the University. The commercial exploitation of North Sea oil has led to many firms with little experience of the marine environment facing problems which require offshore consultancy. Also, internationally known firms in the oil business require longer-term assistance in research and development.

At Heriot-Watt University no less than eleven departments have active offshore interests: Mechanical Engineering, Electrical and Electronic Engineering, Petroleum Engineering, Economics, Offshore Engineering, Chemical Engineering, Biological Sciences, Physics, Civil Engineering, Chemistry and Building. IOE draws on the expertise and equipment of the appropriate academic departments as well as on its own staff in undertaking consultancy.

IOE also organizes seminars, courses and conferences for senior engineers and managers, usually on highly specialized topics. Lectures and tuition are given by the best available experts from universities and industry, at home and abroad.

All the activities of the Institute, therefore, can be regarded as aspects of information collection, transfer or generation. The Information Service, with its highly specialized library, provides information by reference to publications and to experts inside and outside the University. The Information Officer serves not only IOE and other Heriot-Watt staff but also provides an enquiry-answering service to industry and the general public. Moreover this service is at present available without any charge except, of course, if an unusually large amount of staff time is needed.

Style and scope of the service

The subjects covered by the information service are of necessity drawn from many disciplines and include oceanography, petroleum technology, instrumentation, navigation, diving, pollution control, hydrodynamics, communication systems, corrosion science, underwater construction, geotechnics, naval architecture and safety engineering. Although the accent is on technical data, the

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Information Officer also deals with the relevant aspects of occupational medicine, international law, economics and energy studies.

The Institute moved into its own purpose-built premises in the University's Research Park in 1974, pleasantly situated on the Riccarton campus in the countryside to the west of Edinburgh. The library occupies a room of 30 sq. m. on the ground floor. So far the Information Officer has been in sole charge, though he can draw on very capable clerical support. There are places for four readers.

The Information Officer is responsible to the Director of the Institute, and selects library materials within an annual budget with, of course, suggestions and advice from other members of IOE staff. The main features of the library stock are important collections of periodicals and conference papers, including those of the Offshore Technology Conferences held at Houston, Texas, since 1969. There are also holdings of directories, reports, standard specifications and trade brochures. The Information Officer files ephemera and cuttings from daily newspapers, and keeps collections of annual reports, patents, statistics, government publications, maps and text books. The Scottish library of the Society for Underwater Technology is also kept in the Institute.

Cataloguing

Because of the multidisciplinary nature of the material, no existing classification scheme is suitable: instead the collection is catalogued, and indexed by concept coordination. The various kinds of material are arranged as appropriate: conferences in alphabetical order, standards in numerical order, journals in alphabetical and chronological order. The pamphlets and trade brochures are assigned accession numbers and kept in boxes in numerical order. Loans of library stock are only made to IOE staff so that the material is always available in the building for use by the Information Officer in answering enquiries. A copying machine is available for document reproduction within the terms of the Copyright Act.

Incoming material is catalogued in as much detail as is considered necessary, following the Anglo-American rules. The catalogue is in sheaf form in three sequences:

1. Authors and editors,
2. Corporate authors, publishers and manufacturers,
3. Titles, including conference names.

An item may justify an entry in any or all of these categories.

Indexing

Subject indexing is also carried out in greater or lesser depth at the discretion of the Information Officer. Individual conference papers or journal articles may or may not justify an accession number and full indexing. A post-coordinate system of eighty-column punched cards is used. A card is assigned to each of the indexing terms, which are drawn from the University of Tulsa Exploration and Production Thesaurus. For each item the relevant cards are punched with a hole that indicates the accession number of the item.

There is also a subject index in sheaf form used for references to the more ephemeral journal articles; it is in five sequences:

1. People,
2. Organizations and firms,
3. Places including names of oilfields,
4. Subjects,
5. Meetings, past and forthcoming.

Several bibliographical tools are also used for information retrieval, the most important being *Petroleum Abstracts*, with its Annual Subject Index, published by the University of Tulsa.

Bibliographic searching

The Information Officer has on-line access to the Dialtech and Systems Development Corporation computerized bibliographic searching services in Frascati, Italy and Santa Monica, California respectively.

There is, naturally, frequent cooperation with Heriot-Watt University Library and the Information Service participates in the 'Informal Group North Sea', a library and information referral scheme in the Edinburgh area, and contributes to the Group's Union Catalogue. IOE is also a member of Aslib. The Information Officer maintains contacts with colleagues in the United Kingdom and abroad who have common interests.

Heriot-Watt University staff and students and others from near and far come to use the library facilities. Such a compact and comprehensive collection on marine technology is probably not available in this country except in the libraries of the large oil companies and of some government departments.

Enquiries

Many enquiries reach the Information Officer by letter or telephone. In 1976 53 per cent of these were from England, 27 per cent from Scotland, and the rest from Wales, Ireland, USA, Belgium, Norway, South Africa, India and Switzerland. The enquirers were mostly (62 per cent) from industry, 17 per cent were students, 4 per cent were academics and 8 per cent were from other research institutes. Examples of the enquiries received in 1976 are:

How do waves influence the stability of pipelines on the sea bed?
How does the behaviour of oil slicks at sea depend on the type of oil?
What is the Joint Advisory Survey Board?
Who are the manufacturers of platforms and rigs in Scotland and where are the construction sites?
Who is currently researching into sea bed foundations?
Can g.r.p. withstand the water pressure at a depth of 600 ft?
What has been written on the subject of dredging?
What is the drag co-efficient for anchor cables for buoy moorings?
Who are the licensees of block 11/30?
What is blaes (Blaise)?
Is there a good text book on gas lifting and injection?
What accidents have involved damage to rigs and platforms in the North Sea since 1974?
How are drilling ships and semi-submersibles positioned?

In 1976, apart from enquiries about IOE itself and Heriot-Watt University, 44 per cent of outside enquiries were technical, 34 per cent were about commercial or other organizations and 16 per cent were bibliographic. The rest were general—some appeared to be from students who expected the IOE Information Officer to carry out their projects for them!

Publications

Selective Dissemination of Information services are available by arrangement and technical translations are arranged in the field of marine technology. Each month the IOE Library Bulletin is produced. This contains a list of accessions and details of forthcoming meetings of interest to offshore engineers.

The Information Officer has been involved in the indexing of the *Directory of Current U.K. Research and Development relating to Offshore Structures and Pipelines* which IOE has prepared for the Underwater Engineering Group of CIRIA. A *Guide to Information Services in Marine Technology* was also compiled and has been published by the Institute. This booklet directs enquirers to the organizations most likely to be able to help them.

Conclusion

With the exploitation of offshore oil in areas of even deeper water, and in particular with the support of the Science Research Council for an expanded programme of marine technology research at Heriot-Watt University, the Institute of Offshore Engineering and its information service look forward to a period of expansion and continuing contribution to the rational use of our ocean resources.

Post-coordinate indexing and the prescribed classification and cataloguing curriculum in ALA-accredited library schools: a national case study together with proposals of general applicability

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The introduction of post-coordinate indexing within the mandatory education in subject headings, classification and cataloguing at ALA-accredited library schools was slow to follow the adoption of the technique in the library and information field. Surveys conducted in 1956, 1961 and 1966 produced no positive evidence of the teaching of the method. A recent study has found that rather less than half the schools were teaching coordinate indexing and most of these granted it only slight attention. Those schools that covered coordinate indexing were far more likely than the average school to include UDC in the classification part of the curriculum. Schools which featured modern integrated courses of wide scope nearly all taught coordinate indexing. There are strong vocational and academic arguments to warrant the incorporation of the model in all required instruction in concept and term analysis and special librarians can work towards this end through curricular consultation with the schools.

WHAT HAS BEEN the outstanding contribution of special librarianship to library school courses in subject analysis and cataloguing? For the greater part of curricular history cogent arguments may be advanced on behalf of the UDC scheme, but in the past quarter century the notable innovation has surely been the science and art of post-coordinate indexing.

Mortimer Taube and his colleagues at Documentation Incorporated successfully pioneered the technique during the 1950s, using the form of verbal uniterms and special librarians and information officers took up this new tool, tested, adapted and refined it. There is no evidence, however, that this mode of indexing was quickly incorporated into the required classification and cataloguing instruction, since the Young report[1] did not mention it at all in the list of topics taught in twenty-nine responding ALA-accredited library schools.

In 1961 another investigation[2] of basic courses was conducted and drew responses from all of the then thirty-two accredited schools. An exact picture of the curricular place of post-coordinate indexing at this time was not provided because it was not named as such on the survey forms and though uniterms were enumerated they were grouped alongside minicards, punched cards, machine literature searching and electronic computers under the generic umbrella of machine retrieval. Now machine retrieval of information was covered by five schools in the compulsory cataloguing and classification curri-

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culum but clearly uniterms in particular and post-coordinate indexing in general might have been taught by less than five schools. Yet the very mention of uniterms in the questionnaires suggests that the surveyor considered that their inclusion in basic cataloguing instruction was a distinct possibility in 1961.

In 1966 a study was made of library school prospectuses which resulted in profiles[3] of cataloguing courses at different levels. The basic level profile did not mention post-coordinate indexing—indeed the only mention of this technique was at doctoral level.

The latest and most comprehensive enquiry[4] into North American compulsory education in classification, cataloguing and subject headings secured the co-operation of forty-seven of the then fifty-eight accredited schools. The details provided below also incorporate the answer of a further institution which submitted its returns too late for inclusion within the published survey report. Some twenty (or 42 per cent) of the forty-eight schools included post-coordinate indexing in the required instruction but in thirteen of the twenty the attention paid was only slight. Of those seven schools which accorded the technique more substantial treatment, one reported that it had been inserted recently into the cataloguing curriculum as a result of consultation with groups but no specific lobby was named. Two of the schools teaching post-coordinate indexing stated elsewhere in their responses that they included thesauri in their teaching of technical systems and made their students examine them—one cited the *New York Times* thesaurus, the other covered not only this but also the ERIC thesaurus.

Most surveyors of North American curricula seem to have assumed that post-coordinate indexing as taught on that continent concerned uniterms or other verbal descriptors. This assumption is reasonable given the ubiquitous incidence of the dictionary catalogue in modern American library practice, with the classified variety having the status of an endangered species. For many decades American library school instructors have also shared this predilection for the alphabetical subject catalogue, with the latest findings[4] establishing that the schools put more than four times the emphasis on both theoretical and practical aspects of the dictionary catalogue than on the classified type. Classified files of all kinds are indeed far more common in Europe and it was in Britain during World War II that W. E. Batten invented and applied a form of coordinate indexing featuring notational elements.

It is interesting to observe that seventeen of the twenty schools teaching post-coordinate indexing also taught UDC as one of their classification schemes in the basic classification and cataloguing courses. Of the thirteen schools paying slight attention to coordinate indexing, eleven also taught UDC, and of the seven schools giving greater notice to coordinate indexing some six also taught UDC. Thus 85 per cent of the twenty schools covered UDC as against only half the schools taken as a whole, the conclusion being that a school teaching post-coordinate indexing was much more likely to also teach UDC as a technical system. The seventeen schools teaching both were doubtless fully aware of the needs of special libraries. No evidence was sought or supplied to establish that UDC or any other scheme was taught specifically in connection with coordinate indexing and as suggested above this is unlikely.

The history of American library education shows that the former separation into discrete courses of subjects such as cataloguing, subject headings, classification and shelflisting gave way to the now characteristic unified courses comprising such constituent techniques. Six of the forty-eight schools included the teaching of subject headings, classification and cataloguing within modern integrated foundation courses of wider scope in which the three techniques constituted but a minor part of the matter. The courses in these six special schools were—in contrast to the more traditionally organized courses—much more likely to reflect theoretical advances and to devote a larger share of course time to theory and less on practice. Their teachers were much more likely to believe that such courses were ahead of typical library practice. Of these six schools five taught coordinate indexing, though three of them gave it merely brief notice and of the five schools at least three (one school did not fill in the section on schedules) also taught UDC in the basic curriculum.

It has been shown that post-coordinate indexing was taught by less than half of the library schools and usually then only to the extent of a short consideration. But why should compulsory courses in or involving classification, cataloguing, and subject work incorporate this technique? There are two good reasons for recommending its inclusion:

1. The technique is or may be used as an appropriate problem-solving device in special libraries, information bureaux and in special sections of general libraries. Since the compulsory instruction may be for many or even most students their only library school exposure to subject analysis and synthesis, it is important that it should offer some degree of preparation for starting professional service in the main kinds of libraries. The traditional basic courses from 1887 to date have always tended to reflect a bias towards academic, public and national librarianship. It is true that schools offer various specialist electives but it is desirable that the uncommitted student should be introduced in basic courses to a wide range of technical problems and solutions.
2. Coordinate indexing is not simply yet another named technical system but stands as a fundamental model. During its long history, the characteristic obligatory classification and cataloguing course has never been tightly constructed about a contrast of enumerative and analytico-synthetic modes as expressed in both subject heading lists and classification schemes, nor has it in recent years expounded the great pre-coordinate and post-coordinate divide. A 'models' approach is essential to the student's comprehension of the college subject of concept and term analysis and synthesis.

There are then cogent vocational and academic grounds for making the compulsory courses in any country that cover subject analysis, classification and cataloguing to include post-coordinate indexing and to guarantee it enough theoretical and practical treatment so that students can assess it fairly in relation to other models and systems.

To these ends, special librarians both individually and collectively can facilitate reform by liaising with the library schools and their curriculum development panels.

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Readability is usually taken to mean the ease of comprehension of written materials and is expressed numerically. In this project, readability scores for eight guides to the literature were calculated using three readability methods. These were the Dale–Chall, Flesch Reading Ease and Smog Grading methods. Correlation coefficients between the methods were calculated and they proved significant at the 5 per cent level. The effect of jargon words on the Dale–Chall method is discussed.

READABILITY IS USUALLY taken to mean the ease of comprehension of a written passage and is expressed numerically. Numerous readability formulae have been developed[1,2] and these fall into two main types. One type, called 'element counting methods', involves the study of various language elements in a passage. For example, the Dale–Chall method[3] uses the average sentence length in words and the number of words not on a standard list of 3,000 words. The Flesch Reading East test[4] uses the average sentence length and number of syllables per sample. The results produced by such formulae have shown repeated good correlations between readability score and actual ease of comprehension. Although, of course, 'style' of writing is not the be-all-and-end-all of written materials, it can have an important effect on the interest of the reader. Sentence lengths of over 100 words occurred several times in this study!

The results described below are from a pilot project—done prior to a large programme on the readability and listenability of library user educational materials. Guides to the literature are not easy to write or to read. Many things described in them are inherently complicated to explain. Readability tests can indicate if the style of writing is making a difficult task for the reader more difficult. Three readability methods were applied to eight guides to the literature. Of these guides, five were commercially produced and three library produced. The three methods were:

(a) Dale–Chall
(b) Flesch Reading Ease
(c) Smog Grading.[5]

(a) Dale–Chall method

A readability score is given by the formula

$$0.1579x + 0.0496y + 3.6365$$

where x = percentage of words outside 3000 word list, and y = average sentence in words.

This method has been one of the most widely used since its formulation, but

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requires considerable time if automated versions are not used. Five to six person-hours may be needed if data are double-checked.

(b) Flesch Reading Ease method

A score is yielded by the formula

$$206.835 - 0.846wl - 1.015sl$$

where wl = number of syllables per 100 words, and sl = average number of words per sentence.

Thus a higher score means 'easier' comprehension. Like the Dale–Chall, this method has always been popular and it also requires a considerable amount of time. For this study an algorithm derived by Coke and Rothkopf was used. It estimates the number of syllables in a standard Flesch sample from the number of vowels.

(c) Smog Grading method

This is a very much simpler and faster test than the other two. A score is yielded by counting the number of words of three or more syllables in a standard sample and then using the formula

$$\text{Smog Grading score} = 3 + \text{square root of polysyllabic count}$$

If a producer of library-oriented materials wants to test their readability, a simple, fast test is likely to find acceptance. However, these tests must have an accuracy comparable with the more established tests. Therefore, in this project, correlations between the three tests were calculated (Table 1).

The originators of the tests related scores to educational or difficulty levels thus:

Dale–Chall

up to 8.9	Pre-college
9.0 to 9.9	College
10.0 upwards	Graduate

Flesch

0 to 30	Very difficult
30 to 50	Difficult
50 to 60	Fairly difficult

Smog

13 to 16	College
17 to 18	Graduate

Workers such as Bormuth[9] have suggested that the relationship between test score and passage difficulty for older language element tests may not be linear but curvilinear. Formulae taking note of this and using other language elements may in fact be able to produce more accurate relationships. It is planned that a number of such formulae will be included in our larger research project on user

	DALE–CHALL	FLESCH READING EASE	SMOG GRADING
BURMAN, C. R. *How to find out in chemistry* Pergamon. 1965	10.336	27.761	16
MELLON, M. G. *Chemical publications.* 4th ed. McGraw-Hill. 1965	9.892	32.874	16
WOODBURN, H. M. *Using the chemical literature* Dekker. 1974	10.028	35.362	15
BRUNN, A. L. *How to find out in pharmacy* Pergamon. 1969	9.282	29.153	14
BOTTLE, R. T. *The use of chemical literature.* 2nd ed. Butterworth. 1969	10.100	28.027	16
SUNDERLAND POLYTECHNIC LIBRARY *Biological sciences: a guide to publications . . .* 1974	10.339	24.589	15
LIVERPOOL POLYTECHNIC LIBRARY *A student's guide to the literature of nursing* 1977	8.042	49.411	12
CITY OF LONDON POLYTECHNIC LIBRARY *How to find out in biochemistry* 1975	9.203	32.153	13

TABLE 1: *Readability scores*

education materials. However, these considerations do not make the three tests used in this study unacceptable for general library purposes, especially peer comparison (*e.g.* Richardson[10]).

The correlations between the tests are:

	Dale–Chall	Flesch	Smog
Dale–Chall	*	−0.85	0.91
Flesh	−0.85	*	−0.69
Smog	0.91	−0.69	*

These are all significant at the 5 per cent level.

A number of workers[7,8] have felt that books in some subject areas are rated by the Dale–Chall method as more difficult than they actually are. This is because the 3,000 word list lacks even quite common jargon words of these

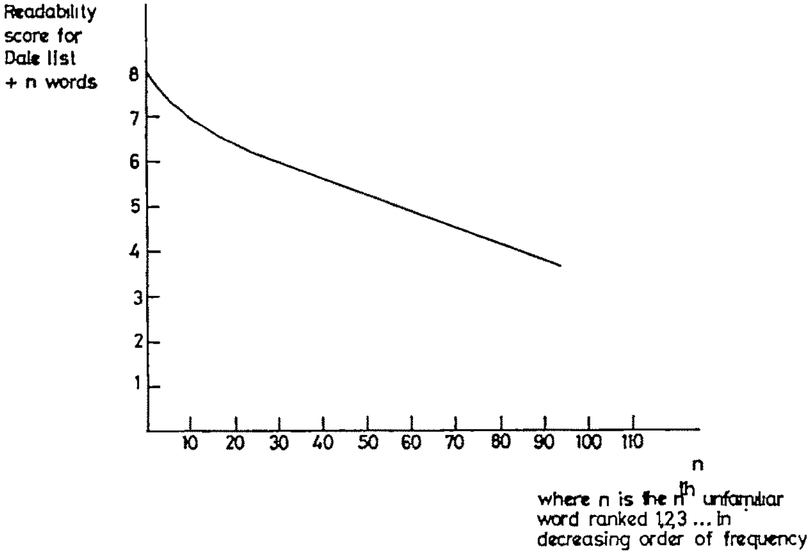

FIG. 1: *Effect of 'unfamiliar' words on Dale–Chall score*

subjects. With guides to the literature, certain words must crop up very regularly. Hopefully they are adequately explained in the guide but they still count heavily towards worsening the readability score. For example, consider *A Student's Guide to the Literature of Nursing* produced by Liverpool Polytechnic Library. If the ten most common 'unfamiliar' words are added to the Dale 3,000 word list, the readability score is reduced from 8.04 to 6.90. Figure 1 displays the effect on readability score of all ninety-three unfamiliar words in the samples used from this guide. Similar graphs were derived for the other seven guides.

In conclusion, I would like to acknowledge my debt to Mr. J. Higgins and Mr. M. Money for their great help during the project.

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BRIEF REVIEWS

COUSINS, L. B. *and* RAMSAY, W. J. Heat Bibliography 1974. Guildford, England, 1977. £18.00. (ISBN 0 902852 70 1.)

After a gap of three years, the Heat Bibliography series, previously published by HMSO and now taken over by IPC Science and Technology Press, continues with the 21st, 1974 edition published in 1977. The Fluidics Group of the National Engineering Laboratory which compiled the bibliographies for 1948 to 1973 is now collaborating with the Atomic Energy Research Establishment, Harwell to produce the series as part of the joint Heat Transfer and Fluid Flow Service (HTFS).

The bibliography covers literature of all types, including patents, reports and theses, in the fields of heat transfer and fluid flow. Arrangement of the 1974 edition is by subject headings and subheadings. The main subject headings are the same as in the 1973 edition, with the omission of the section: Chemical and Physical References to particular substances. Format of the references is similar, but a helpful change is the addition of keywords to each reference, which should assist greatly in identifying the subject content of each item. Language is indicated when other than English. Most of the original documents are held at the HTFS and the HTFS reference numbers are given. Where the abstract only is held this fact is indicated. Heat Bibliography, 1974 indexes mainly-1973 and 1974 documents but a little earlier material is included.

The return of the series will be welcomed by many libraries, particularly if the HTFS can catch up with the production to amend the present time lag.

JENKINS, P. *ed.* The Financial Times International Business Year Book 1977/78. London. Financial Times. 1977.

The Yearbook is an easy to use source for extensive information on the top international companies also including sections on International Comparisons, International Markets, International Economic Groups and Countries. The latest edition remains virtually unchanged in format but a number of new companies have been added, bringing the total to nearly 800, and the entries for countries now include Ghana, Iraq, Kenya, Malaysia and Thailand.

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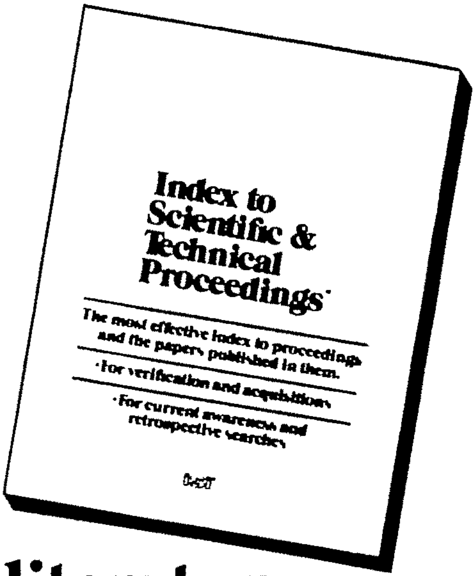
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Should we educate our users?

Elizabeth Orna

Engineering Industry Training Board, Watford

Paper presented at a one-day seminar at Aslib on 2nd June 1977 on Interacting with users for effective information use

THIS ARTICLE CAME about because of an attempt to plan a seminar on user education in special libraries. While there are any number of user-education studies in educational institutions, there is a singular lack of them in special libraries and industrial information services. Aslib very properly wanted to do something to fill the gap on the practical side, to complement the survey it was sponsoring.

In the event, however, those of us who tried to plan the seminar came to the conclusion that there was no future in straight 'user education' for our kind of users. If anything was needed—and we thought it probably was—it was help for information professionals in establishing the kind of interaction with users which builds mutual respect and trust, and so allows information services to develop as an integral part of the whole organization.

The basis for that conclusion was the many differences between, on the one hand, educational institutions, and, on the other, the various kinds of working organization in which special information services function.

What is different about special library users?

Universities, colleges and schools all have two populations: the teachers and the taught. Teachers stay, the taught come and go after a defined period, having been taught. The relationship is one of some inequality. Students are there as part of their preparation to become 'real' workers, while those who teach them are already 'real' workers and so are in a position of authority. The extent to which the students respond to what they are taught is their own affair, and the consequences are restricted to the individual. This is the context of 'traditional' user education.

The organizations in which special information services function are very different. They have several populations, defined by occupations—managers, scientists, administrators, professionals of various kinds, shop-floor workers, commercial staff, etc. All are more or less permanent and their movement into and out of the organization is to no defined pattern. Their interactions are infinitely more complex than those between teachers and students. The organization as a whole interacts with individuals and groups within it, they interact with one another, and the organization and its employees interact with the world outside—suppliers, customers, institutions, government agencies. All these interactions produce multiple information flows and information systems.

Even more significantly, the users of information services in working

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organizations are not there as learners. They are in the very different position of being paid to exercise already acquired knowledge and skills (and many of them are paid more than the staff of the information service and hold a superior position in the hierarchy. Though few of them will have had training in information handling as part of their education, they are assumed by the organization to know both what their information needs are and how to meet them. The assumption may or may not be correct, but it is there, they are aware of it, and it conditions their attitude to information use and information services. Those who are conscious of not knowing how best to find and use the information they need for their work may well feel anxiety about exposing their deficiency either to their immediate colleagues or to information staff—especially if the organization's climate is not favourable to openness. Others may be convinced that an information service has nothing useful to tell them because they have so much experience or have built up their own resources to the point where they have all they need—and they may be right.

Finally, to complete the comparison with education institutions, in the working organization a great deal more depends on information use. Whereas if the individual student does not know how to search for and extract information, that is just his bad luck, in the working organization failures to acquire and use information bring a collective penalty, because of the interdependence of all parts of the organization.

Some learning objectives

The situation is thus not a promising one for the direct education of users who are employed rather than students. It does no harm, however, to set out a few learning objectives of the kind of behaviour we would wish to encourage in users. Perhaps they would be on these lines:

Users should
(i) be aware of what the information service can do
(ii) identify their information problems
(iii) communicate them to information staff and discuss them with them
(iv) give feedback to the service
(v) keep information staff aware of their changing subject interests
(vi) involve the service in projects which have information implications.

These are achievable objectives—not for all users all of the time, but for a significant proportion of them for a significant part of the time. Something can be done towards these objectives by direct education of new staff, at induction courses for example, but the real work has to be done in other ways, especially where it concerns existing senior and long-established staff.

Instead of direct education, the process is more like that shown in Figure 1. There are two main stages: first to find ways of getting insight into users' needs; second to find ways of taking initiatives which will allow the information service and the users to educate one another. It is defined as a mutual process, because fellow professionals from different disciplines should be able to learn from one another; if the traffic is one-way only, there is an inequality and assumption of superiority on one side. It is a cyclical process; interaction

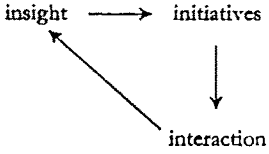


FIG. 1: *Insight, initiatives, interaction*

between information staff and users leads to further insights and new initiatives.

There are advantages in the situation, as well as difficulties. Because the organization's work is for real, the gains from good information work are better appreciated, the potential for earning professional respect is higher, and so are the chances for establishing long-term mutally helpful relations with users. There are many possibilities for the information service to integrate itself into the organization and make itself indispensable.

Know your organization

The basis for the strategy of an information service which seeks this kind of relation with its users should indeed be the most thorough understanding of the organization in which it works. Although the aim is a productive interaction between the service and its users, it would be a deception to think the way to it lay through concentration on human relations, 'interactive skills', 'sensitivity' and the like. Good personal and professional relationships between information workers and their colleagues elsewhere in the organization are a necessary, but not a sufficient condition for ensuring effective information use. They cannot be purposeful unless they are backed by a strategy which derives from thorough knowledge of the organization. Knowing the organization provides a frame of reference against which the various options open to the service, the allocation of resources, the priorities of individual demands, and ways into contacts with users can be evaluated and decisions taken.

There are three things we need to know about the organization in which the information service works:

(a) its structure and how power is distnbuted in it
(b) the way information flows in it
(c) its purposes and aims.

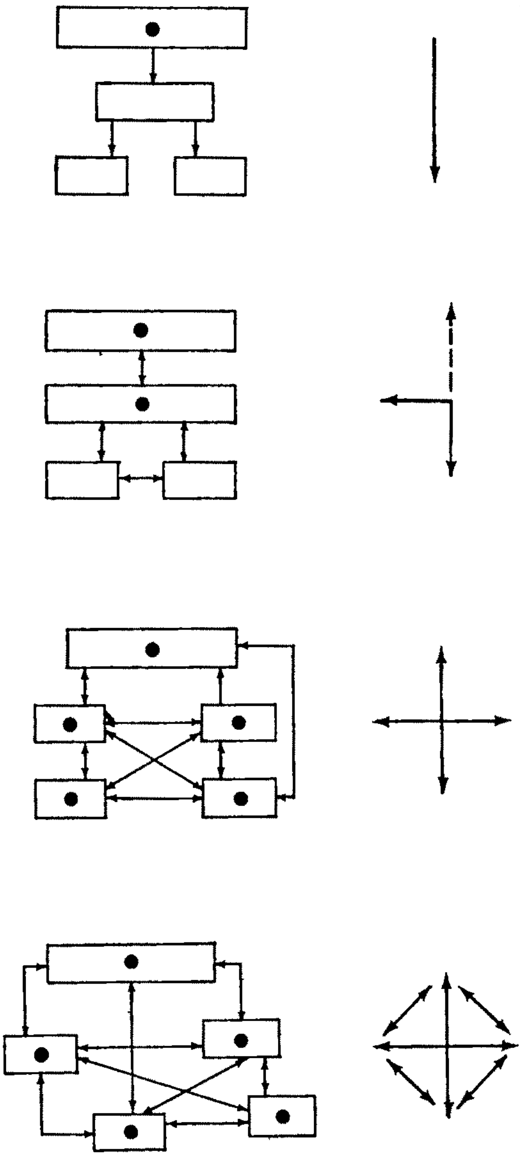
Writing about the structure and power distribution of organizations is a minor industry in itself, but without making oneself into an amateur expert on organization theory, it is useful to be able to recognize the main characteristics of one's own organization and to relate them to the observations of those who have examined a lot of organizations. It can help us to judge both the constraints and the opportunities which the information service has—and among the opportunities, whatever the form of organization—is that of becoming skilled in making the organization work for us, and learning to play it as a responsive instrument.

It is generally accepted that a scale of organizational forms can be distinguished. It runs from, at one extreme, the rigidly hierarchic and centralized, to

Organizational form

Information flow

Organization characteristics



Vertical hierarchy

fixed decision rules
and chains of command
centralized decisions
little horizontal
communication

Organized by 'function areas'

mixture of fixed
decision rules and
autonomous function
rules
shorter chains of
command, more decision
points

Network type

flexible decision
rules, more autonomous
decision making
information feedback
from bottom to top
of organization

More diffuse network

highly adaptable
organization
information flows and
decisions evolve in
response to needs
rather than preset
objectives
more and quicker
feedback in all
directions

FIG. 2: *Organization characteristics and information flow* (*based on McHale* 1976)

at the other, the flexible and 'project-centred'. In the former, all lines of power and communication converge from the bottom towards the top; in the latter, power and authority are distributed in a variety of centres, and lines of communication tend to be horizontal and diagonal. The two extremes are sometimes described as mechanistic and organic.

More recent approaches seek to devise combinations of the strengths of vertical and lateral organization by 'matrix' management, which supplements the hierarchical system by a collaborative one, or by informal 'task teams' which operate within the functional structure. The aim is to get the benefit of both a functional system based on specialist expertise and a collaborative one in which people from a number of levels and functions work together to solve complex problems jointly.

Organization characteristics and information flow

It would be wrong to think that the form of organization dictates the quality of what goes on in it. Within any form, from the most hierarchical to the most flexible, there can be good and bad, prevailing relationships of high trust or suspicion, free or constricted flow of information, but the form will influence how information flows in the organization. Figure 2 shows how organization characteristics are linked with information flow.

Most if not all organizations can indeed be looked at as a set of interlocking

		inputs from	outputs to
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	Personnel	corporate planning financial planning accounts departmental managers administration own records	corporate planning financial planning accounts departmental managers administration
Outside	*R & D*	research associations academic institutions personal contacts customers	other researchers research associations
	Personnel	professional institutions employment services careers service other firms government agencies	employment services careers service potential employees

FIG. 3: *Information inputs and outputs in an organization*

information systems, each of which generates information, takes in information from outside itself, and then processes it and outputs it. Most of the systems consume some part of their own output as input, as feedback for controlling their activities. It can be illuminating to analyse one's own organization in this light. Figure 3 shows information inputs and outputs for two typical departments in an organization.

There are a number of advantages in making an input–output study of this kind. It gives an insight into what information is generated in the organization, who generates it, who uses it, and how they use it. It shows who has the authoritative information on given subjects, who can be expected to know what, and who *cannot* be expected to know. It also reveals gaps in information provision, and shows missing links in chains of information. All these are useful to an information service in planning its strategy.

Carrying out an analysis of this kind needs careful preparation. One enters a sensitive area when one starts asking questions about who knows what in an organization. It is therefore important to make it quite clear why one wants to ask, and the advantages that are anticipated, for example avoiding duplication by the information service of information that users already receive from other sources. It is best done by direct discussion with managers responsible for different functions and departments.

The organization's purpose

The third thing we need to know about the organization is its purposes and aims. Every organization has them—though some have odd ways of pursuing them. They may be implicit, or may be explicitly set out in the form of detailed corporate objectives and targets. They may be to maximize profit, to gain the lead in a particular market or a given field of development, to provide a service, or to exercise influence on the policies of other organizations.

If the organization is one that applies management by objectives or some related technique, the objectives of the whole organization will be set out formally in documents that are updated year by year. The usual form is to select 'Key Result Areas', to break each of these down into a set of objectives, and then to list for each objective a set of targets and the criteria by which the achievement of the targets can be measured.

This can provide a very immediate way into the organization, if the information service makes it one of its own objectives to be aware of the objectives of all departments, and to discuss with them the information implications of their objectives and agree with them on how to meet their information needs.

Another good source of intelligence about where the organization thinks it is going is any form of strategic plan which covers a period of a few years ahead and sets out priorities for policy. This allows an information service to include in its objectives the study of the strategy, so as to work out its implications for the resources it will need, the areas it should concentrate on, and the initiatives it can take.

For following up the day-to-day implementation of plans, one of the best sources is minutes and papers of committees and working parties which have responsibility for formulating policy and carrying out policy decisions within the framework of overall objectives and strategy. It is essential for the information service to receive all these documents, and the output of any reporting system of main departments, so that information staff can keep track of what is happening in the areas where they have particular responsibility and take whatever action is appropriate.

This kind of knowledge is a useful basis for action in a number of ways. Not only does it provide 'ways in' to various parts of the organization and pegs on which to hang initiatives; it also—because it derives from an ordered structure of priorities—gives us the means of judging where most resources should be devoted, and the relative time and effort that should go into different initiatives and into meeting different demands. Corporate objectives make a neutral framework against which conflicting demands can be assessed, and reference to them can make an inoffensive way of giving certain demands low priority.

Insight into users' needs

So much for gaining insight into the organization, as a means of understanding what users of the information service are doing and for what purpose. We now need to look at how the information service can utilize the clues that come to it in its day-to-day work, for insight into the needs of users, and into their ways of working.

The requests for information that the service receives can be a useful key to both the content and the form of presentation that users require. Analysis of requests can show trends in the use of the service, the rates of use by different departments, the subject range of inquiries, and the degree of specificity and generality, as well as indicating developing areas of interest, users' response, and ground as yet untilled that might be worth cultivating.

Other ways of gaining insight into the activities of users arise from the fact that the organization and its staff are generators of information which the information service can profitably use. The first is acquisition, as a matter of policy, of whatever is published by the organization or by individual members of its staff—both reports, books and articles directed to outside, and documents designed primarily for internal use.

Another is the direct exploitation of the specialized knowledge of the staff of the organization as an information resource which can be drawn on to help their colleagues, by means of an index of expertise. This means taking initiatives in order to win support for the idea and acquire the information, and the ground needs to be carefully prepared. It illustrates an important principle—if one wants to be able to help other people from one's own expertise, one of the best ways of making that help acceptable is to ask them first for their help. If one goes to them, acknowledging them as experts on a subject where one is not, and asking if they are willing for their knowledge to be drawn on to help other colleagues, they are likely both to agree and to accept one as a person of good sense, from whom they will be willing to seek help in return.

Interaction and feedback

There are many other ways of developing interchange between the information service and the rest of the organization. They include:

1. helping users to set up small systems for handling information which they need for immediate reference
2. talks by people from user departments about the work of their department, for information service staff
3. regular visits by information staff to meetings of user departments, to talk about the service and get feedback from users
4. assignment of members of the information staff to get to know particular areas of the organization, and to share their knowledge with their colleagues in the service.

The most important thing of all is to use every form of interaction, from the most formal to the completely informal, as a way of getting feedback from users, so that there is a constant built-in check on whether what is offered is achieving what it is meant to achieve.

Direct informal feedback can be incidental to most of the activities mentioned; they could hardly take place without. It can also be sought more formally. Users can be asked to return a simple form about the usefulness of information supplied in response to their requests. At intervals, recipients of everything that the service circulates regularly—periodicals, bulletins, accessions lists and so on—can be asked 'Do you still want to go on receiving this?' From time to time, it is worth making a survey of a representative sample of users—preferably by interview rather than by questionnaire—to find out in more detail how they use information, what their preferences are among the range of services available, and what value they set on the information service, for example in terms of the time that it saves them. If the information service is planning to introduce a new service or to change an existing one, this also should be an occasion for drawing in a group of users to help evaluate a pilot run. Not only will their experience be useful in development, it will also help the introduction of the change if the information service can tell users that it has been piloted with the help of their colleagues.

Education for interaction

If information staff have the responsibility for taking initiatives in starting and developing interaction with users, to what extent can they train themselves for this role? My own answer would be that it is most profitably done by treating it as staff development, making the training grow out of the real tasks and problems of the information service. It is useful to anchor the development to any formal cycle of objective-setting which the organization may follow, because this allows information staff to look at the development of the service in the context of the organization's policies. Staff can be drawn into analyzing the information implications of those policies, and can then co-operatively establish joint and individual objectives which include promoting interaction with particular parts of the organization. Specific targets (that is, actions designed to achieve the objectives) could include:

i. making a series of visits to given departments to talk about the information, and getting feedback from the staff in them

ii. examining a range of library communications, assessing their effectiveness, and reporting on recommended changes
iii. carrying through changes that have been agreed on, and evaluating them, with the co-operation of users.

The point was made earlier that it was important and productive to seek help from other parts of the organization, drawing on the skills and knowledge of individuals in them. This can be combined with staff development for information service staff by inviting representatives of user departments to give a seminar on their work and its place in the organization.

When it comes to information staff themselves going and talking to gatherings of other departments, they sometimes feel reluctant, and fear they may not be able to cope because they have no training and little experience in speaking to groups of people. Nobody should be forced into this unprepared, but it is possible to help them to the point where they are ready to take on such assignments with confidence. One useful preparation is to give them the chance of talking to small groups whom they know well—their own information service colleagues for a start. A useful piece of staff training is a series of sessions in which every member of information staff presents a short talk abouth is/her work to the rest of the information department, and answers questions. This allows staff to understand how their colleagues' work complements their own, and helps to identify gaps, overlaps, and possibilities for new developments, besides giving the speaker a chance to gain confidence in talking.

For the rest, it is very much a matter of using all opportunities to help information staff to develop self confidence in dealing with other professional colleagues, readiness to seize chances for taking initiatives, an inquiring mind always alert to what is happening in the organization and its environment, and a basic understanding of organizations and their interactions with the individuals who compose them. Those who are responsible for information services should take it as one of their first obligations to see that *all* staff in the service—not just the professionally qualified ones—develop this approach to their work.

Long-term gains

Finally, why go to all this trouble? What are the long-term gains to be expected from taking on these responsibilities? There are at least three:

A. an insurance for the information service of a central and indispensable place in the organization,
B. a contribution to making the organization a healthy one, more scope, more autonomy,
C. more enjoyment in work for information staff.

From the point of view of simple self-preservation—which is never to be sneezed at—it is dangerous for an information service to be out on a limb of the organization chart. Here, by definition, it is almost bound to play a non-initiating role, because it will not have the knowledge of what is going on in the organization to enable it to do much else. In such circumstances, as Scarfe[1] has pointed out, information services evolve into 'self-perpetuating bureaucracies, continuing to perform automatically the tasks for which they were originally created, unaware that these are no longer relevant to the needs of the parent body, and incapable of constructive change . . . such information units', he rightly remarks, 'become progressively more detached and self-justifying, until their ineffectiveness is finally perceived, and dissolution inevitably follows.' He contrasts this sorry state of affairs with what 'the information manager of the future' should be doing—getting the service into a position of being aware of new directions in policy as soon as they begin to be discussed, and maintaining a 'constant flow of information about the parent organization into the information unit'. When this is happening, the unit will be in a position to 'exploit this knowledge and to ensure that appropriate information flows are initiated within the organization, between its constituent members, and that appropriate information is drawn in from outside and directed into the correct channels.' All that I would disagree with there is the placing of it in the future—what is wrong with doing it now?

Benefits for the organization

It is not just a matter of self-preservation, however, for an information service to seek a position close to the centre of the organization and to know as much as possible about its policy formulation and plans. It is good for the organization too to have a service that collates information from various sources within the organization, and puts it to use for the mutual illumination of people working in different parts of it who are separated by the very structure of the organization. More than this, an information service can consciously act to rectify the balance in whatever is the dominant form of its parent organization, for any form of organization has weak points that are the reverse side of its conspicuous strengths.

In a parent organization that is towards the hierarchic end of the scale, an information service can use its position to legitimize lateral communication between people in different chains of the hierarchy whose work is complementary. It can circumvent administrative barriers to permit people to reach the information they themselves identify as necessary for their work, rather than what their superiors consider they need. To operate in this way, it is, of course, necessary for an information service to know the organization machine and all its protocols very thoroughly, and to pay it due tribute, so that the machine works to the advantage of the service and does not impede it in its real tasks.

In the less common situation of a more fluid form of organization an information service can make itself at home because 'project-centred' ways of working are compatible with modern trends in information work. In such an organization structure it can perhaps provide a balancing function of a different kind. Project-centred organization has the inherent danger that, in its changes to meet changing demands, there is unnoticed leakage away of valuable information which could be utilized for the solution of new problems. An information service could perform a valuable function here in preserving the record of the forms of organization adopted to meet different problems, and of the solutions developed, as a resource of information for tackling future situations.

Recent work, from both the information and management theory sides,

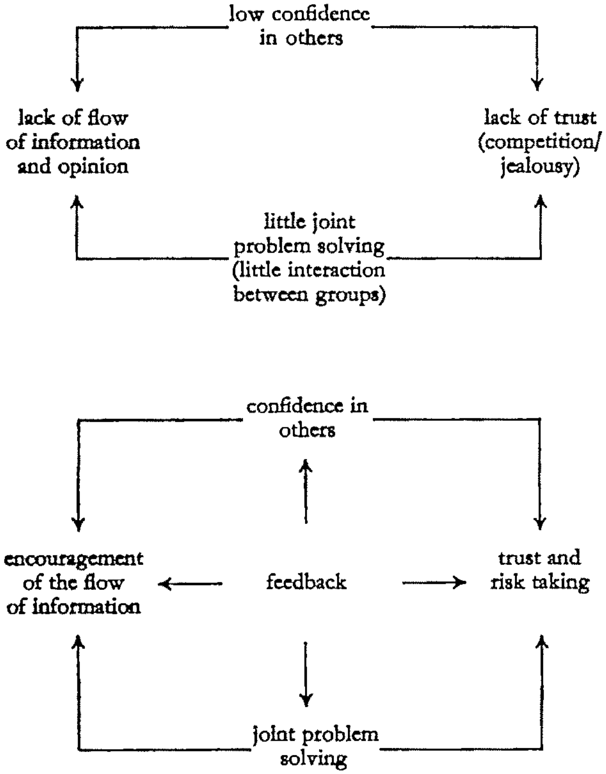
low confidence in others
lack of flow of information and opinion
lack of trust (competition/ jealousy)
little joint problem solving (little interaction between groups)
confidence in others
encouragement of the flow of information
feedback
trust and risk taking
joint problem solving

FIG. 4: *Information flow and organization health* (*based on Olsen* 1977)

tends to confirm that an organizational climate that favours open information flow is good for organizational health. Olson's[2] studies of how organizational factors affect information flow in science-based firms suggest that management philosophies which isolate key groups of workers, discourage openness and the transfer of information, and relegate information services to a low position in the hierarchy, lead to situations where the firms become less able to meet their objectives, as shown in Figure 4.

Argyris[3] distinguishes two ways in which organizations learn. The first is a process which enables the organization to correct errors so as to be able to carry on with its present policies; the information which permits this kind of learning does not go outside the limits set by the present policies, and indeed information which could lead to questionning of these policies is likely to be unwelcome and disregarded or suppressed in organizations which are equipped only to learn in this way—to the ultimate detriment of the organization.

The second kind of organizational learning—one which Argyris says organizations and their managers find it difficult to adopt—depends on the provision of valid information, on the basis of which free and informed choices can be made. The information needed for this kind of learning includes that which can lead to questioning of policies. The consequences for organizations which are able to learn in this way are high-trust relationships, high freedom of choice, internal commitment and readiness for risk-taking, and willingness on the part of the organization to test its theories openly. The long-term result is increased organizational effectiveness.

As for increased scope, autonomy and enjoyment, these come from knowing one's way around, seeing the many options for action, learning to move freely in the organization, helping to build trust and helpful interchange between colleagues, and finding continual opportunities for development. 'Creative subversion' has many satisfactions to offer those who practise it, as well as being beneficial to their organizations.

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Designing a business information service for top management

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TWO BUSINESS LIBRARIANS recently went on record[1] as saying that 'top management tends to have a smaller need for information because it is frequently involved in the decision-making process or has its own network of contacts'. The truth is that for the very reason that top management is involved in decision making, its need for timely and accurate information is of paramount importance. Heading the list of top management's own network of contacts should be the in-house library and information department. This situation can only be achieved, however, if certain golden rules, which are outlined later, are observed.

Benefits of a business information service

Directors and senior management can profit from the activities of a well designed in-house business information service in the following ways:

1. Regular receipt of information published by outside sources about their own company. Main Board directors responsible for subsidiary companies, for example, need to be kept informed of press coverage of those companies' activities.
2. Regular receipt of information on events taking place in the outside world. Multinational companies need to know rapidly, for example, of political and economic developments in the countries in which they operate or to which they export, as well as the reported activities of competitive companies.
3. Access to an information research facility which can help find answers to most questions that arise concerning politics, economics, companies, industries, countries and personalities. This is the information directors need to make their decisions. This facility also ensures that the company benefits from its membership of numerous outside organizations by effective exploitation of sources of specialized information and publications.
4. Availability of a reliable depositary for published documentation. Directors and senior management, by virtue of their position in industrial life, receive considerable amounts of useful published information, some of it unsolicited. A well-designed library and information department, as recipient of this material, can exploit it to the company's best advantage.

Structure of a business information service

The prerequisite for a successful business information service for top management is that it has access to top management. The most effective way of ensuring such access is to structure the library and information department as part

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of the public affairs division in a complementary role to the public relations department. The effect of this arrangement is that the Head of public affairs, who is increasingly found to be a board member and the one most concerned with communications activities, has under his control a two-way flow of information—public relations disseminating corporate and financial information outwards and library and information disseminating and researching information about the outside world inwards.

A further advantage of this arrangement is that even a generous budget for library and information activities will look modest when compared to the amounts of money required for corporate and financial advertising or producing and mailing the company's interim and annual reports.

Elements of a business information service

(a) *Acquiring and disseminating information*

The speed of modern business developments world-wide is such that many companies must avail themselves of an agency wire service, such as the Press Association's News Wire or Reuter's City Newswire, to keep themselves up to date. The printer is best housed in the library and information department where the output can be scanned regularly and disseminated, on a selective basis, to directors and senior management.

Second only to this method for speed is the complementary system of selectively disseminating items from the daily press and other primary sources to directors with known information needs. These items of information can subsequently be incorporated into a press digest, which may be published daily. The press digest should be designed to keep senior and middle management, particularly in subsidiary and overseas companies, informed of reported developments concerning the company, its competitors and its markets.

The well designed business library and information centre will ensure that relevant directors are supplied as quickly as possible with copies of important and topical publications of the day, such as Government green and white papers, and other publications which receive extensive press comment. This is more difficult to achieve in companies based outside London and requires judicious use of a mixture of channels such as parliamentary consultants, stockbrokers, public relations consultants and specialist booksellers. A particularly useful version of the latter is the type which specializes in daily collections of documents ordered from London publishers.

(b) *Researching information*

Documentation housed in the library obviously forms the nucleus of information from which questions asked by directors are researched. Business libraries will increasingly contain less-traditional sources of information such as newswire print-out, radio and TV transcripts, company card services, microforms, cassette tapes, a television set equipped to receive Oracle, Ceefax or Viewdata and a terminal linked to data bases specializing in business information.

Second only to in-house resources will be access to a considerable network of outside sources of business information and publications which is achieved by the company's membership of outside organizations or by library subscriptions to information services such as the Financial Times Business Information Centre. The company library and information department is well placed to advise whether or not corporate membership of particular bodies benefits the company from the point of view of access to specialized information.

Golden rules for meeting the needs of top management

Directors and senior management will inevitably come to rely on their in-house library and information department as their primary source of business information if the following golden rules are observed:

1. Ensure that at least one senior member of the library and information department's staff is always available to assist directors either by phone or in person. For a director to be told that no one is available to assist him at the moment, or till tomorrow, is the certain formula for failure. This means that the business library of larger companies should be staffed by at least two qualified professionals to ensure coverage at all times.
2. Disseminate information from a wire service or published sources such as the daily press as quickly as possible. The reason for this is that directors of most companies tend to be in a negotiating position with senior officials in governments, international organizations, banks and other companies for much of the time and therefore need to be aware of the latest developments in their areas of responsibility, literally as they happen. Print-out from a wire service machine should be scanned at least half-hourly.
3. Carry out research for directors as quickly as possible. The results must, however, be accurate and up to date. A characteristic of directors is that they tend to require answers to complex questions in half-an-hour's time. These deadlines and criteria can only be met if in-house sources of documentation are fully up to date and if first-class contacts have been regularly maintained with outside sources.
4. Take great care to present information to top management which is reasonably attractive to look at and not too daunting in bulk. Photocopies, for example, must at least be of reasonable quality. Care should also be taken to ensure that items of information destined for directors contain full details of the source and the date of publication.
5. Keep library systems and organizations as straightforward as possible. Avoid elaborate schemes for cataloguing, indexing and filing. Use printed abstracts and indexes as much as possible. Maintenance of complex systems requires an inordinate amount of time and money.

Observation of the principles outlined in this paper will go some way towards emphasizing to top management the vital role which the business information manager can play in the professional management team.

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Pruning periodical subscriptions at Glasgow University Library

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Faced with the prospect of a swingeing 15 per cent cut in their periodicals budget, Glasgow University Library carried out during 1977 several exercises to determine which titles would be missed least and whose absence would damage the integrity of the research collections least. The exercises — Use Survey and Departmental Grading — are described, together with the problems encountered, the benefits derived, and the lessons to be learned.

Introduction

Like most other British university libraries[1] Glasgow has had to make severe cuts in its spending upon books and periodicals during the past year or so as a result of the combined effects of inflation, the falling value of the pound, and the reduced grants in real terms to universities. It may be of some interest to other libraries who have yet to undertake this painful operation, to see how Glasgow went about it, the results, the problems, and the benefits, and to see how they can learn from our experience. We do not suggest that our methods were unique or ideal, and in fact there is a certain similarity to those used by Hull.[2]

At the beginning of the 1976/77 academic year it became clear that as inflation of periodical prices was running at something over 30 per cent, some serious effort was necessary to try and prune periodical subscriptions by as much as 15 per cent before they consumed the entire budget available for both books and periodicals. In the prevailing economic climate no new subscriptions could be contemplated, much to the dismay of many academics. At that time the Library Committee was attempting to limit expenditure on periodicals to 38 per cent of the combined fund for books, periodicals and binding.

Background

The University Library Committee receives a block grant from the University Court for books, periodicals and binding and it is sub-divided as the Committee thinks fit. There is no specific allocation to individual faculties or departments, although the University Librarian keeps an overall watch on the balance of spending. On the whole the Library prefers to deal with the eight faculties (Arts, Divinity, Engineering, Law, Medicine, Science, Social Sciences, and Veterinary Medicine) rather than with the multitude of departments.

At the beginning of the session the University Library and its four branch libraries had nearly 8500 serials, according to the computer-produced serials list; not all of these are purchased or funded as periodicals, nor, indeed, are

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they all classified as such. Fifty-three per cent of the total proved to be purchased as periodicals, and it was on these titles that the remaining exercises were concentrated.

The University Library is organized on a subject rather than a functional basis which means that periodicals are the concern of a variety of departments. The six subject divisions of Reader Services deal with matters such as liaison with academic departments, cataloguing and classification, computer listing, weeding and discarding, identifying gaps in the collection as highlighted by inter-library loan requests, actual use of periodicals, sending for binding, shelving and labelling. The Periodicals Department (a section of Acquisitions) is only concerned with the routines of placing orders, payment of invoices, recording receipt of parts and chasing non-arrivals.

Table 1 gives a breakdown of the mode of acquisition in the various subject divisions of the Library and its branches.

Use Survey

As a first step a survey of use of current parts of purchased periodicals was carried out for a four-month period beginning in December 1976. Readers were asked to initial forms attached to the front of each unbound part each time they consulted one. Considerable staff time was involved, first of all, in determining which periodicals were in fact purchased from the periodicals fund and not from the book fund as 'continuations' or received on exchange or as gifts. Titles known to have been heavily used in the similar survey in 1972 and those for which subscriptions were still on trial were omitted from the survey. All open-access parts of the Library were covered and also the Chemistry and Dental branch libraries. At the end of the survey period it was possible to give a minimum measure of use for each periodical.

Sixty-two per cent of the purchased periodicals were surveyed, and these showed at least 19,700 uses in the four-month period, or 7.9 uses per surveyed title. About 13 per cent of all the purchased periodicals were not used at all during the survey. Bearing in mind that heavily used titles were specifically excluded from the survey, divisions where a low proportion of titles were surveyed showed a low-use figure per surveyed title and vice versa:

e.g.	Social Services	27 per cent of titles surveyed.	2.8 uses per title.
	Physical Sciences	79 per cent of titles surveyed.	9.8 uses per title.

Despite this, use per title was considerably higher in branch libraries than in the main library. With a smaller stock and better known clientele it is easier to keep track of the use of periodicals, and to weed out lesser used ones in the normal course of work.

Departmental grading

Before the Use Survey was completed the Library Committee decided it also wanted an evaluation of periodicals by academic staff. To this end, in January 1977, lists of periodical titles, broken down into 57 subjects, were submitted to academic departments for grading into four categories. Seventy-seven departments or faculties received lists on all subjects likely to be of interest to them.

Subject division	*Gift exchange deposit*	*% of total*	*Purchased as books*	*% of total*	*Purchased as periodicals*	*% of total*	*Total*	*Titles within total not shelved as periodicals*
GUL								
General Reference	347	43	156	19	310	38	813	287
Physical Sciences	753	42	74	4	952	54	1779	189
Biological Sciences	241	21	141	12	787	67	1169	96
Social Sciences	560	44	22	2	689	54	1271	122
Philosophy/Law History/Theology	142	15	256	27	560	58	958	228
Humanities	244	29	140	16	469	55	853	137
BRANCHES								
Chemistry	4	2	56	22	200	77	260	7
Dental	24	27	2	2	64	71	90	—
Soviet Studies	250	41	58	9	305	50	613	—
Veterinary	63	29	5	2	151	69	219	3
Series distributed	—	—	441	100	—	—	441	441
Other	—	—	—	—	3	100	3	—
TOTAL	2628	31%	1351	16%	4490	53%	8469	1510

TABLE 1: *Serials in Glasgow University Library*

The subsequent gradings were collected as follows:

58 per cent of the grades given were A (essential)
25 per cent of the grades given were B (desirable)
13 per cent of the grades given were C (useful)
4 per cent of the grades given were D (cancel)

Many titles were graded by more than one department, and in some cases these gradings conflicted with one another.

The lists circulated were sectional subject lists derived from the Library's computer-produced serials list, and had been annotated by library staff with the mode of acquisition, so that academic staff could concentrate on the purchased titles.

First cancellation list

In April 1977 a list of one hundred and forty-eight titles with no recorded use, and which had received 'cancel' grading or no grading at all (indicating that no department was interested) was produced. This list of possible cancellations was circulated to faculties for final scrutiny, and requests for reprieve of thirty-three titles were accepted.

As a result of these two prolonged and administratively expensive exercises one hundred and fifteen titles were cancelled to the value of about £2,500, which was only about 2 per cent of the total periodicals budget. However, the titles culled in this way were considered to be of no particular loss to the University as nobody spoke in their favour, and they probably represent dead wood areas in which research is no longer active. Whereas they represent 2 per cent of the total periodical expenditure, the proportion was as high as 6 per cent for the faculties of Engineering and Social Science, and below average for Arts, Law and Science. A further list of nearly two hundred titles for possible cancellation with very low use and marginal ratings was drawn up by the Library, but was never acted upon as it was overtaken by subsequent developments.

Cash limits

It was originally hoped that voluntary cancellations of the above type which did not really hurt anyone would be sufficient to achieve the level of saving required—certainly 5 per cent and possibly as much as 15 per cent. This proved to be wishful thinking, and more drastic measures were required. The original departmental gradings were based upon the intrinsic merits of each journal, rather than upon their cost, but it was now felt that cash limits must be imposed in order to achieve sufficient savings. In June faculties were each asked to prepare lists for possible cancellation of 10 per cent of the total cash value, and a supplementary list of a further 5 per cent. In order to provide faculties with the relevant information on which to base their selection, fresh lists were drawn up of titles apportioned by faculty of main interest including the last annual subscription paid converted into the nearest pound sterling, the results of the Use Survey, and the departmental ratings. It was then left

Subject division	Total purchased periodicals	Number surveyed	% surveyed	Not used at all	% of total periodicals	Parts surveyed	Uses	Uses per surveyed title	Uses per used title
General Reference	310	204	66	77	25	628	1222	6.0	9.6
Physical Sciences	952	752	79	165	17	6114	7367	9.8	12.6
Biological Sciences	787	499	63	92	12	3753	3323	6.7	8.1
Social Sciences	689	185	27	81	12	862	518	2.8	5.0
Philosophy/Law History/Theology	560	323	58	56	10	1656	1690	5.2	6.3
Humanities	469	356	76	38	8	1481	2491	7.0	7.8
Chemistry Branch	200	121	61	19	10	909	2183	18.0	21.4
Dental Branch	64	43	67	1	2	442	906	21.0	21.6
TOTAL	4031	2483	62%	529	13%	15845	19700	7.9	10.1

TABLE 2: *Survey of use of current parts of periodicals*

to faculties to draw up their cancellation lists as they thought fit, in some cases advised by the appropriate library staff.

It was at this stage that the seriousness of the economies required was brought home to most members of the academic staff within the University. With a 15 per cent cut, almost everyone would have to do without one of 'their' periodicals. Very strong representations were then brought to bear on the Court and Senate by faculties and individuals that the Library should not have to bear a cut of equal proportion to that inflicted upon other University departments. They realized what a vital asset the Library—and in particular its periodicals—was to the working of the University now and in the future.

Nevertheless most faculties produced the requested lists by the end of the summer. However the representations to the Court bore fruit and a large, supplementary grant was made, so that in the end only a 5 per cent cut in periodical subscriptions was required.

Second cancellation list

Having produced lists for 10 per cent cancellation and a further 5 per cent, it was a relatively simple matter for faculties to cut the first 10 per cent list in half to produce the required savings. Some faculties voluntarily exceeded this in order to be able to subscribe to much needed new titles. (In future, new titles have to be compensated for by further cancellations of existing subscriptions, to an equivalent cash value.)

Before actual cancellation a consolidated list of all cancellations offered was prepared and circulated again to faculties for final scrutiny. In October two hundred and twenty-three titles to the value of about £8,500 were cancelled, that is 7 per cent of the periodical budget. Subsequently about £1,450 of this saving was used for new subscriptions, and a further £540 for back sets. Both sets of cancellations resulted in a net saving of 7½ per cent.

Observations on the titles cancelled

Where advice was sought, the Library suggested that faculties should look particularly at very expensive titles, foreign language journals, cover-to-cover translations, specialized abstracting or indexing services that may be covered by more general services, titles duplicated elsewhere within the University system, as well as those which received little or no use during the Survey, or which were rated low by departments.

Of the three hundred and thirty-eight titles cancelled the foreign language breakdown was: 11 per cent German, 10 per cent each Russian and East European, and French, and 7 per cent other foreign languages. About 14 per cent were abstracting or indexing journals (including all sections of *Excerpta Medica*), about 5 per cent from learned societies, about 4 per cent were directories or yearbooks, about 4 per cent were 'Advances' or reviews, about 2 per cent were duplicate copies, and over 12 per cent cost £100 per annum or more. These very expensive titles accounted for 67 per cent of the total cash saving.

Problems

1. *Multiplicity of records*

In the long life of the Library a variety of records for periodicals has inevitably been built up by various departments within the Library, each serving the needs of that particular department with little co-ordination between them. Only exercises of the current nature, for which none of our records were designed, show the shortcomings of the system, and indicate the vast benefits that would accrue from a much more sophisticated machine-readable record incorporating everything.

2. *Mode of acquisition*

For the purposes of the current exercise we were limited to those titles purchased from the periodicals fund and therefore it was necessary to determine the following categories in order to eliminate everything not purchased from the periodicals fund:

a. Purchased from the periodicals fund,
b. Purchased from the book fund,
c. Gift (may include some exchanges),
d. Exchanges, where this can be easily established,
e. On deposit from the European Community (EEC documents),
f. Purchased from class or departmental library funds, but placed in the University Library.

In some cases it was possible to determine the mode of acquisition from the actual parts, but it was more often necessary to consult the Kardex record.

In cases where subscriptions cover more than one title, only the major title was considered and the subsidiary ones were ignored. If the major title is selected for cancellation, it is assumed that the lesser ones would also be cancelled.

3. *Title*

Because of the different uses made of the original records, there was some variation in title used in the computer-produced serials list, which was the basis for most of the work, and in the Kardex record.

4. *Subscriptions and exchange rates*

As far as possible the last complete year's subscription was established from the Kardex record, converted to the nearest whole pound sterling. Supplementary payments were included, and, for instance, two-year subscriptions were halved.

5. *Subject*

Subjects of University departments and subject groupings within the Library are not identical. In most cases the faculty or departmental lists made up from lists of periodicals classified by broad subjects proved satisfactory, especially when dealing with faculties rather than departments. In a few cases titles were subsequently re-classified when the faculty of main interest was not the one to which they had been originally assigned.

6. *Constant change*

During the course of the year subscriptions were increased, titles changed, publication ceased, and exchange rates changed. However, the situation in May, when most of the work was done, was considered as the base for further operations.

7. *Co-operation by academic staff*

Most faculties returned lists by the dates requested, and few reminders were necessary, although there were quite a number of changes made after lists were first submitted. For the major exercise the onus was on faculties, and where they chose to divide further into departments (e.g. Faculty of Arts) they had greater difficulties of co-ordination than a faculty like Science which merely split its massive list into Physical and Biological, even although its share of the bill was much greater.

8. *Time*

The amount of library staff time—much of it at a senior level—required by the entire exercise was very considerable, and it is very doubtful whether the savings resulting from the cancellations were greater than the administrative costs, especially if the time spent by academic staff and committees are included as well. However the savings are recurrent whereas the costs are not. The particularly time-consuming activities were:

a. Attaching and removing about 16,000 forms on current parts of periodicals, and adding up the results,
b. Noting the mode of acquisition of about 8,500 periodicals,
c. Finding out the latest subscriptions paid, and converting many to sterling, of about 4,500 periodicals,
d. Typing, annotating, reproducing and circulating a great variety of lists, and then collating the results.

The amount of time taken was rather greater than it might have been, since the three stages of the exercise as described here (Use Survey, Departmental grading, and Cash limits) were not all envizaged from the outset, thus causing quite a lot of duplication of effort. For instance, the Kardex records were examined first to discover mode of acquisition, but no account was taken then of the actual subscription price: this had to be determined as a separate operation at a later stage. With hindsight one would collect at the beginning all the data about both mode of acquisition and cost, then conduct the Use Survey within the Library. Faculties and departments could be circulated with one set of lists for grading and cash limits.

9. *Speed*

Lists were always required very quickly, therefore most of the data was collected at high speed, with no time for checking or validation. Inevitably errors occurred, but not of a sufficiently high incidence to invalidate the results—the general picture was accurate, even although faults of detail could be found.

Benefits

As well as the obvious benefit of a saving of 7½ per cent on the annual periodicals budget, the following benefits also accrued:

A. *Housekeeping.* As a result of the various investigations by library staff into the mode of acquisition, subscription costs, etc. a certain amount of 'spring-cleaning' of periodical records was possible. A number of titles had lapsed, ceased publication, changed title, or split, and the records for these could then be corrected and brought up to date. A small number of alterations of classification were made to reflect the current interest by departments or faculties.

B. *Collection of useful data.* The Library now has a mass of data which may help in selecting further titles for cancellation in the future. It is hoped that at least the data on mode of acquisition can be fed into the existing data file from which the serials list is produced, so that at least will not have to be determined from scratch if and when a similar exercise is ever repeated. Factors like subscription, amount of use, and departmental grading may change in the course of time, so are not suitable for addition to the present unsophisticated computerized record. Perhaps this underlines the need for all such data to be available in machine-readable form, so that selective listings, statistics, etc. can be produced with so much less human effort and cost.

C. *Local-operation.* Lists of possible cancellations were circulated to the two other large Glasgow libraries (University of Strathclyde, and the Mitchell Library) and to Edinburgh University Library, partly for their information, and partly so that they could indicate which of the titles they also held. This information was fed back to faculties, but did not appear to have had any influence on their final choice. It did at least pay lip-service to the idea of co-operation in the acquisition of periodicals.

D. *Awareness of the Library.* Certainly the greatest benefit to result from the extraordinarily expensive exercises administratively was the very much increased awareness by academic staff of the value and cost of the Library and its periodicals to the University. They proved willing not only to express their feelings in private, but also at high level committees, to the end that the University did finally re-apportion funds in the Library's favour.

Extensive operation involving periodicals records similar to those described above are far more easily undertaken if all such records are in machine-readable form. However if they have to be done manually, the high administrative cost should not be underestimated and it is advisable to devote time at the outset to planning and anticipating all possible developments to prevent duplication of effort. Attention to high-priced titles, in the first instance, may give maximum return for minimum effort.

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1 In their recent *Annual Reports* University College London, and the Universities of Liverpool, Newcastle, Aberdeen and Hull all mention substantial cuts in their periodicals spending.

2 BRENNAN, M.M. Periodical cancellations: what happened at Hull. *BLL Review*, 5 (2), April 1977, p. 67–73.

BRIEF REVIEWS

GARFIELD, EUGENE. Essays of an information scientist, vol. 1 1962–1973, vol. 2 1974–1976. Philadelphia, I.S.I., 1977. 1314 pp. $25.00. (ISBN 0 89495 000 2.)

Much of the material in these two volumes is taken from Garfield's column 'Current Comments' in *Current Contents,* with some articles from other journals and excerpts from relevant books. The items are in chronological order. There is a subject index at the end of the second volume as well as a cited author index so that the reader can conduct personal citation analysis. Citation analysis is one of the main topics but the essays also range over a wide field, including two on jazz transcriptions. The foreword is by Joshua Lederberg who pays tribute to Garfield's work and particularly to the effect of citation analysis as a way of estimating the intellectual influence of any one person's writings. Most of the articles are two or three pages long making these volumes very browsable, although they could also be used to trace the growth of I.S.I. or of scientific information work since 1962.

HYMAN, RICHARD J. From Cutter to MARC: access to the unit record. New York, Queens College of the City University of New York, 1977. 40 pp. Queens College Studies in Librarianship no. 1. (ISBN 0 930146 10 7.)

The central concern of this study is the shift in emphasis from unit card to unit record; emphasis has shifted from physical format to intellectual access, the concern of all librarians. Dr Hyman brings us up to date on the numerous by-products of the L.C. catalogue which have emerged lately to allow for a more extensive bibliographical search under a greater variety of access points. The author thinks that 'for the foreseeable future, even in computerized libraries, one will have to consult vast unautomated files in traditional unit record format'. He compares MARC format with that of the traditional unit record. The traditional unit is not as flexible as the MARC record although it affords many opportunities for manual multiple access, particularly for co-ordinate retrieval of descriptive and subject cataloguing data. Appendix 1 is a useful, four-page glossary; appendix 2 is a chronology of events relating to the subject; appendix 3 is a table of multiple access points.

PITERNICK, ANNE B. *ed.* National conference on the state of Canadian bibliography; Vancouver, Canada, 22nd–24th May 1974, proceedings. Ottawa, National Library of Canada, 1977. 514 pp. (ISBN 0 660 00898 X)

The conference consisted of a series of symposia at which experts could discuss with their colleagues the current state of Canadian bibliography. Canadian studies are so broad in scope that there is no very satisfactory way to encompass them in a series of meetings each devoted to a single topic, so these papers are seen as a compromise. The conference passed a formal resolution

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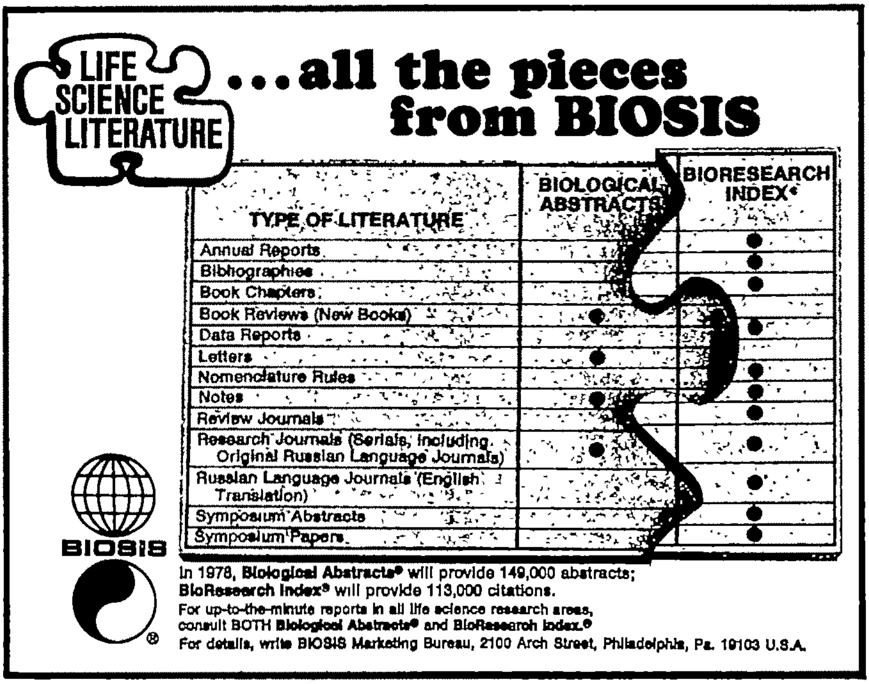
urging the formation of a national advisory council responsible for identifying needs and assigning priorities for the development of Canadian bibliography. As a result a Committee on Bibliographical Services for Canada has been formed; its terms of reference are appended to these proceedings. Three papers on national bibliography cover: retrospective, current—*Canadiana,* and current—Bibliotheque Nationale du Quebec. Regional bibliography included papers on: British Columbia, the Prairie Provinces, Ontario, Quebec, the Atlantic Provinces and the North. Subject bibliography is in three parts: the arts, including fine arts and architecture, literature in English and French and music; social sciences comprising anthropology and sociology, education, geography, history, law and political science; science and technology. The form bibliography lession had no formal papers; standards and criteria included a paper on bibliographic standards and standardization. There is a useful index to Canadian bibliographies mentioned in the text.



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CENTRAL LIBRARY

The Information Unit of the Hajj Research Centre

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Jeddah, Saudi Arabia

Background

THE HAJJ RESEARCH CENTRE was set up in 1975 at the King Abdul Aziz University, Jeddah, Saudi Arabia, with the aim of studying the environment of Hajj—the annual pilgrimage to the Holy City of Mecca. Hajj is the fifth pillor of Islam and is performed by all Muslim adults at least once in their lifetime provided they have the means and are physically fit to travel to Mecca.

The Hajj is performed during the second week of the twelfth month of the Hajrian Calendar. As the Hajrian Calendar is based on lunar months, the date of the pilgrimage, according to the Gregorian Calendar, which is solar, changes from year to year. Each year the date falls about eleven days earlier. The tenth day of Dhu al-Hijjah, the twelfth month of the Hajrian Calendar, is the most important day of the pilgrimage and is celebrated by Muslims all over the world.

The final destination of the pilgrimage is the Ka'aba, the House of God, which is situated on the level stretch of the territory of Bekka, in the valley of Mecca at 40.2 degrees East longitude and 21.7 degrees North latitude, about 70 kilometres east of Jeddah. Mecca is about 200 metres above sea level and is surrounded by a high, rugged mountain chain. The local population is approximately 250,000 but at the time of the Hajj this figure increases to about 1.5 million.

Up to a few decades ago the pilgrims had to undertake arduous and lengthy journeys to come to Hajj. The most common mode of transport was the caravan: almost all pilgrims joined one of the two great caravans, one from Damascus and one from Cairo, for safety and protection. They came on foot, on donkeys, on camels; often it took several months to reach the city of Mecca.

With improvements in the world's transport system, the journey to Mecca has become quicker, safer and cheaper. Transatlantic air travel has increased, and continues to grow. Distance has lost much of its meaning and the easier, quicker and cheaper ways of travelling have changed people's attitudes about space and time. Consequently, the number of pilgrims to Mecca has increased exponentially over the last decade: in 1977 some 1.2 million Muslims performed the pilgrimage.

Mecca is a small city. The administration and organization of such a vast influx of pilgrims poses a problem of no small magnitude. Furthermore, Mecca is built not just on a desert waste but also on soil which is said to be sterile. The provision of food and accommodation for the pilgrims is therefore an enormous task.

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The rites of the Hajj require pilgrims to be constantly on the move. When they enter the city of Mecca, they go straight to the Sacred Mosque which in fact contains the Ka'aba. The pilgrims are required to circumambulate the Ka'aba seven times. The Mosque surrounding the Ka'aba has been enlarged several times to keep pace with the increasing number of pilgrims. The almost circular space around the Ka'aba was sufficiently large half a century ago to accommodate 100,000 pilgrims. The late King Saud had the Mosque enlarged to allow for more than 300,000 devotees to take part simultaneously in the congregational prayer. With the current number of pilgrims well above a million, the difficulties can be imagined.

The pilgrims are required to perform certain rites together at a certain time: they spend one afternoon together at the nearby valley of Arafat, one night on the plains of Muzdalifa and three days and nights in the valley of Muna. They offer a sacrifice of a goat, sheep, cow or a camel and stone the masonary monuments which represent Satan, as a symbolic gesture. All these acts of devotion are carried out in a spirit of brotherhood.

Little imagination is required to see the problems associated with the flow of 1.2 million people in a valley less than two kilometres wide, or the congestion during the circumambulation of the Ka'aba or the confusion during the sacrifice ritual. The associated problems of accommodation, transportation, congestion, hygiene, safety, ecology, etc., are staggering.

Looking at these problems, and keeping in mind that the Hajj has to be performed in the best possible manner, it is obvious that research was needed both to prepare the environment and the pilgrims for the testing task as well as to preserve the character and the cultural heritage of the holy city.

This, then, was the *raison d'être* of the **Hajj Research Centre**. Some of the more specific questions which are studied at the Hajj Research Centre are:

1. How have the variables—number of pilgrims, modes of transport, etc. changed with time?
2. What are the dynamics underlying the change in the social and economic environment of Mecca?
3. How does today's Hajj affect the environment and the ecology of the Holy City? In particular, what effects (harmful as well as beneficial) do the present development projects have on the environment and ecology of the city of Mecca?
4. What is the best and the most flexible way of accommodating the pilgrims in Mecca, Arafat and Muna?
5. What are the main problems with the movements and transportation of the pilgrims? How can the congestion at the various ritual points be removed? In particular, what modes of travel are best suited for the environment and the spirit of the Hajj?
6. What are the critical points of human congestion inside the Sacred Mosque? What is the pressure during the circumambulation near the Ka'aba; and at the *Jamarat* where the monuments are stoned?
7. What are the best ways of performing the sacrifice? How can the sacrifice meat be retrieved? How can it be preserved and stored?

These problems encompass a number of disciplines. Furthermore their religious nature makes them a little sensitive and delicate. The approach of the Hajj Research Centre to these problems is normative and target-orientated. That is to say, techniques of modern science and technology are used to solve some of the technical problems but the overall strategy is guided by a framework of values. There are two guiding factors which ought to be stated:

(i) All research at the centre is directed towards helping the pilgrims derive the fullest spiritual and material benefit from the Hajj for themselves and for the Muslim community as a whole.

(ii) The original mould is always better and more exact than the duplicate produced from it. The Centre tries to preserve and recapture the pristine character of the city of Mecca as described in the Qur'an and the Traditions. All attempts are made to preserve cultural heritage and cultural property.

It is evident that not just the problems tackled by the Hajj Research Centre are unique, but also, in some ways, the approach towards these problems.

The Information Unit

The Information Unit of the Hajj Research Centre is one of the four units at the Centre. The others are the Modelling Unit, the Media Unit and the Independent Studies Unit. The Information Unit is the key unit at the Centre in so far as the other three units depend considerably upon it. The main reason for this dependency is that the Information Unit does not provide only a back-up service to the R and D units, but also takes an active part in the research. The reason for this involvement in research becomes clear as the work of the unit is described.

Collection of Information

The collection of information at the Centre is carried out in two ways. First, the Information Unit acquires such documents and journals (and people!) which are necessary to give a specific answer to an urgent, current question. These questions are usually related to techniques of research, analysis, preservation, simulation modelling, etc. Secondly, the Information Unit actually gathers information in the field: it carries out surveys, interviews, etc. to find out the information needs of the pilgrims and the best way of disseminating information during Hajj. This type of information gathering is not far removed from 'research'.

From its inception the Information Unit was virtually forced to be involved in active research. One of the functions, it was said, was to disseminate information to the pilgrims. Therefore, it was necessary to find out the best way to disseminate this information. There was the problem of languages (pilgrims come from over forty-five nations) and most important, what did the pilgrims really want to know? There was another reason for active involvement with research at the Centre and this concerned the Information Unit's prime function of providing a back-up service to R and D units.

Saudi Arabia is a country without an infrastructure of science and technology.

Libraries are few and not quite up to date. If one is stuck for a piece of information, one is really stuck! It was discovered that if the research team was held up on a problem, it took some three to four months for a technical paper or report to arrive and for the research to progress. To overcome this problem the Information Unit sought an active involvement in the Centre's research. As a member of the research team, one was able to foresee the direction of the research, and in some cases predict months ahead the future information needs of the team. This became easier as one gained intimate knowledge of the problems under attack, as well as the points of strength and weakness of the members of the research team. One was thus able to order the right type of document a few months in advance.

Needless to say that this approach did not always work.

To avoid being caught in such circumstances, the Information Unit developed an invisible college of experts in the fields of concern. If the required information can be acquired via a telex, the problem is solved. Otherwise the Information Unit moves quickly to call in a consultant on a short-term basis.

The Centre subscribes to approximately all core journals on planning, architecture, preservation and conservation, system analysis, modelling, ecology, transport engineering, health and hygiene and information science. In addition a small number of news-orientated publications are also obtained. Although Saudi Arabia's post system is rapidly developing, at present it does pose problems for an Information Unit that needs to be up-to-date in its journal stock. To avoid delay journals are collected by an agent in London and despatched, usually as excess baggage, on a regular basis. In this way, the Information Unit keeps track of the material within its scope and is thus able to supply the monograph, report or journal article that answers a vital, urgent question as and when it occurs.

The Information Unit also takes part in conducting surveys that are not directly related to its work, in research photography and gathering data on cultural property. Of particular interest are the aerial photographs taken during the ten-day period of the Hajj. These photographs contain information not just on the Hajj, pilgrim movements, congestion, number of vehicles at action points, etc. but also on the sites and relief of the area. The safe-keeping of these photographs is the responsibility of the Information Unit.

Storage and retrieval

The diverse nature of data handled has not allowed one large, centralized storage and retrieval system to be developed. Furthermore, it is best, in the Saudi Arabian environment, to keep systems decentralized and simple. The more complex the system, the more difficult it is for the junior staff to handle, and the more problems it yields.

For the sake of simplicity, the technical material is separated from the non-technical. The technical material is mostly in English; the non-technical material consists of sociological studies, theological texts, accounts of pilgrims' journeys, the history of Mecca, etc. and is in Arabic, Urdu and English.

The non-technical information is classified using a special faceted classification developed for this purpose. As this scheme places Islam at its centre it is much more suitable for classification of works on Hajj and consequently gives much greater satisfaction. This scheme is fully described elsewhere.[1]

The non-technical material is bibliographically as well as content indexed in a consistent and realistic way. The indexing terms are well-established (mostly Arabic) words which would be normally used by people using such a system.

The technical material is indexed using a controlled vocabulary thesaurus and retrieved by the use of an optical coincidence cards system. The thesaurus has evolved over a year and a half and contains a mixed-bag of terms from architecture, planning, systems analysis, modelling, transport engineering, ecology and the environmental sciences. Most of these terms are used frequently during technical discussions at the Centre. Uncontrolled indexing is allowed when the thesaurus does not contain the term or set of terms that are used in the document. This usually happens when the document is from a discipline which is not included in the core disciplines of the Centre. The uncontrolled terms are carefully monitored and when and if they appear a number of times, they are entered into the thesaurus and become part of the controlled vocabulary.

The information generated at the Centre—from surveys, photographs, analysis, etc. receives a treatment dependent on its form and nature. Before describing how the data produced at the Centre is handled, it is necessary to briefly describe the work of the Modelling Unit of the Centre.

The Modelling Unit

Models are attempts to imitate ideal systems. The purpose of the Modelling Unit is to simulate a model of the Hajj and the Holy Cities of Mecca and Medina. By its very nature the model must capture the major components and interaction of the Hajj. By referring to the computer simulation model, valuable insights into the Hajj can be gained. It provides a system of logical analysis and data for predicting the future technological, economic, ecological and social development in the Hajj and its environment.

The Modelling Unit has sought to obtain results from the combination of systems analysis and statistical decision theory and to produce techniques applicable to the complex dynamic system of Hajj which involves uncertainties in many input variables. The objective of this analysis is to apply logical, mathematical and scientific procedures to those problems of Hajj that involve:

(1) Movements of pilgrims between various holy places.
(2) Have long term, often irreversible effects on the environment.
(3) Are characterized by uncertainty in many factors relating to the decision-making process.

In its final form the simulation model will provide an invaluable analytic framework for investigating future developments in the Hajj and its environment as well as insight on the effect of various policy decisions.

A great deal of the data generated at the Centre is fed straight into the simulation model. The Modelling Unit is responsible for translating most of the data into computer inputs. The Information Unit is responsible for storing only the analysis in hardcopy form. This applies mostly to fifteen large-scale surveys that the Centre has undertaken.

In the case of photography, the Information Unit is also responsible for storing the 'raw data' once it has been analyzed and fed into the simulation model.

The transparencies are mounted on aperture cards which also contain the descriptive terms relevant to the slide. These terms are included in the thesaurus. Each aperture card is numbered and its number is punched on the appropriate optical-coincidence stencil which contains the relevant terms. The aerial photographs are treated in a similar manner except they are stored on their own. Here descriptive terms also include the grid reference of the photograph; each photograph also gives information on scale, height, date, and the time the photograph was taken.

The final item of data that is stored at the Information Unit relates to cultural property. Cultural property is defined as:

(A) Structures and sites which are closely associated with religious and cultural history of the area.

(B) Structures and sites which are closely identified with events or personalities of religious and cultural importance.

(C) Structures of architectural merit, possessing distinguishing characteristics of a period, style, area or a method of construction, or a specific function, and are valuable for the study of the development of the arts, architecture and technology.

Modern development patterns have left only about 500 such buildings and sites in Mecca, Medina and Jeddah. To gather and store data on these buildings and sites, a special card, about the size of an optical coincidence stencil, was designed.[2] These cards are filled in on the actual sites: data relating to location, size, structual condition, approximate age, main features, etc. is recorded. A photograph of the site is taken and later attached to the back of the card. These cards are numbered and stored together. The data on each card is coded and stored in a similar manner to transparencies and aerial photographs.

Dissemination of information

The information gathered at the Centre is organized and repackaged in four different ways, namely: (a) reports; (b) monographs; (c) journals and (d) books and pamphlets. The latter category is concerned with more popular consumption, while the first three are intended for the community of professionals and scholars and decision makers.

Reports of the Hajj Research Centre are accounts of the work done on particular research projects. The unit produces two types of reports (distinguished by their serial numbers): those for 'open dissemination' (OD) which are circulated to all interested parties and those for selective dissemination (SD) which are distributed only to certain decision makers and selected individuals.

More detailed treatment of particular aspects of research at the Centre are published as *monographs*. Research papers on the work of the Centre as well as outside contributions are published from time to time, in *Hajj Studies*, the Centre's journal which comes out in single volumes.[3]

Most of the Centre's publications are produced in English and Arabic. The

English edition of books and monographs are published in London; the Arabic editions are published in Cairo and Jeddah. Some of the more popular pamphlets, for sole distribution amongst the pilgrims, are published in several languages.

Lectures, seminars and symposiums are frequently held at the Centre as well as in the universities and institutions of higher learning in Muslim countries.

Budget of the Centre

At the beginning of each financial year the Units are required to present a budget for the following year. The allocations are usually fixed and normally cannot be changed in the middle of the year. However, half-way through the year a financial review is undertaken and adjustments are made as necessary. About a fifth of the budget goes on books and periodicals and almost two-fifths on the Centre's own publication and dissemination programme. Lectures and seminars both in Jeddah and overseas take a large proportion of the budget. Fortunately, telex and travelling costs are met from the university fund and thus do not encroach upon the expenditure.

Contrary to popular belief, the universities in Saudi Arabia do not have an infinite reservoir of funds. They are required to budget rigorously and account for all expenditure. However, wastage of resources, both financial and material, is high and near the end of the financial year they are always short of money! This is accepted as being the nature of things in Saudi Arabia.

Conclusion

In over two years of existence the Information Unit has provided a rather solid backup to the research team and helped them with many difficult and multidimensional problems. In a rapidly developing country the information specialist has to be ready to engage in work that would not normally come under special librarianship or information science. The work as well as the problems is many sided and one is forced to acquire a flexible attitude to one's profession. It is simply a question of adjustment and there are ways and means as well as resources available to help one adjust to the best of one's capability—or simply wither away.

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Micropublishing and libraries in the future

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Introduction

I SUPPOSE that even the world itself could not contain the books that should be written. St John, Chapter 21, verse 25.

When St John concluded his Gospel with these words some 1900 years ago books were larger because they were written on scrolls which were an inefficient and inconvenient method of recording facts and storing information. Fortunately they were replaced by the codex which offered a more compressed form of book and was generally more economical because both sides of the parchment could be written upon. The known world was much smaller because it consisted of little more than the extent of the Roman Empire.

Since that time books have become smaller due to the improvement of paper and the invention of printing and the world has become larger as a result of the endeavours of explorers from the thirteenth to the nineteenth centuries. Until now, the world has remained large enough to contain all the books that have been written. But the world is unlikely to become larger—indeed, there are clear indications that it is becoming overpopulated and is running out of space for people, and therefore, books. At the same time paper and print technology seems unlikely to produce smaller books. Moreover as population increases so literary output increases and as, hopefully, a higher proportion of the population becomes literate so this output will grow at an even faster rate.

Special libraries and microform

Two years ago I read a paper[1] at Manchester suggesting that microfiche would eventually replace the book in libraries. Since then, micropublishing activities have been on the increase and although books and periodicals still fill the shelves of libraries, microform collections are growing rapidly. Because micropublications by their very nature take up so little space it is often not perceived that they are rapidly overtaking the hard-copy collections. The Consumers Association' library which has been purchasing and producing microfiche for a little over three years has nearly 40,000 items on microfiche and a mere 8,000 books and pamphlets in hard copy.

Other special libraries also have extensive microform collections but only one library to the best of my knowledge aims to have all its documentation on microfiche and that is a very special library. In fact it is so specialized that it

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may not be accepted as a library. Nevertheless the office of the Registrar of Companies for England and Wales is to a large extent a library and its successful microfiche system should be a lesson to all librarians.[2] The system, which uses jacket microfiche, aims to put onto film the files of some 630,000 companies. The storage system holding this microfiche library at the London reading room is designed to handle the retrieval of up to 3,000 envelopes of microfiche an hour. It would prove an almost impossible task to refile the microfiche after use, so non-returnable diazo duplicates are produced. The twenty-four duplicating units installed at Companies House in London can meet a total peak demand of up to 10,000 copies an hour from the same number of separate originals.

Since its installation the system has had a marked beneficial effect upon the retrieval time for files. This is to be expected since the original hard-copy files occupied about 20 miles of shelving. There have been critics of course as will be the case with any innovation and it is true that there has been a very small proportion of bad filming and sometimes diazo duplicates are unreadable. It has, however, enabled at least one company search agency to operate more efficiently. Formerly the company employed fourteen staff full time at Companies House relaying information back to its analysts. Now it has only four.[3]

British Library

Some of the divisions of the British Library operate services similar to those offered by Companies House. Already they hold extensive stocks of microfilm. The Newspaper library, Colindale, has 93,000 microfilm reels, the Science Reference Library has about 1.4m microforms and the Lending Division claims to have over 320 miles of roll microfilm and over two million microfiche.[4] It is a pity that the various divisions cannot standardize the way in which they quantify their microfilm holdings. It is also a pity that the only division which attempts to give a service similar to Companies House is the Lending Division which will supply diazo duplicates of certain microfiche—generally American Government reports supplied by the National Technical Information Service. These reports are also available from the Technology Reports Centre operated by the Department of Industry.

In my view a far greater proportion of the stock of the British Library should be on microfiche and then non-returnable diazo duplicates could replace the present inefficient lending-cum-protocopy-cum-reference system. At least one member of the Lending Division, however, considers that the microfilming of the serials stock at Boston Spa would be uneconomic.[5] The figures he produces would seem to indicate a very high microfilming cost and the estimate of storage space required for microfiche is much too high. Moreover his statement that retrieval cost are higher for microform than hard copy is quite contrary to the experience of the operators of business microform systems. No indication is given of the savings in postage costs incurred when sending lightweight microfiche instead of bulky books and periodicals. But the most important factor that has been missed completely is that whilst microfilming the stock of the Lending Division a high proportion of the stock of the Reference Division is also being filmed. That of the other copyright deposit libraries is also being filmed at the same time. I understand that these libraries are hard pressed for space and since any extension of their buildings will be paid for by the taxpayer I think the question of microfilming the stock of the British Library deserves serious consideration. If the stock of the Reference Division were microfilmed it would mean that the proposed new building on the Somers Town site need not be built. To me the new building is a huge white elephant which will service the needs of dilettante scholars who happen to live in London. Readers in Birmingham and other provincial cities will derive no benefit unless they are wealthy enough to be able to afford British Rail fares and London hotel prices. If the greater proportion of the stock were available in a form that enabled 'on demand' duplicates to be made cheaply and quickly, the entire English speaking world would benefit. This would be possible if the system similar to that of Companies House was adopted by the British Library.

Public libraries

The job of encouraging the reading public to accept microfiche as an alternative to the book and periodical must fall to public librarians. A survey conducted by the Public Libraries Research Group with which I am currently involved has indicated that the majority of public libraries in the United Kingdom have a proportion of their stock on microfilm. This majority, however, makes this section of their stock, reference only. Very few libraries lend or sell microfiche. This may be due to the fact that few have microfiche duplicating facilities. It can also be argued that few borrowers have microfiche reading facilities and will not wish to purchase viewers. But public library users purchase very expensive stereo equipment in order to play gramophone records which they borrow. If books were made available as microfiche then they would purchase viewers.

Other uses for microform

Because it is cheaper to make dizao duplicates from master microfiche than operate a loan system which necessitates the refiling of microfiche on return, every library user will begin to build up his or her own personal library. One American writer has already advocated this in a paper entitled 'A personal microform system'.[6] He says: 'the future of microform lies in personal use and acceptance rather than storage efficiency'. Microfilm systems should be designed with the needs of the user constantly in mind, not for the convenience of the archival librarian.

Newspapers

It is unlikely that libraries will rapidly change from being depositories for printed documents to microfilm stores. The process will be gradual with certain types of material being filmed before others. The most obvious part of the library stock offering itself as a candidate for microfilming is the newspaper collection. This is because newspapers are printed on cheap paper which disintegrates after a short while; they are difficult and expensive to bind; not easy to handle; and although not often used take up a disproportionate amount of space. Newspapers are generally filmed onto 35mm roll microfilm. But roll film is not so handy from the user's point of view as microfiche. Often he may require a few issues of a newspaper which he would like to consult away from the library. It is most unlikely that he has a portable roll film reader and if he did it is unlikely that the librarian would allow him to take away complete film and it would be most uneconomic to duplicate 200 ft of film. If newspapers were on microfiche, however, a few diazo duplicates would enable the reader to take away with him the issues he required for a few pence. He would then see the sense in purchasing his own portable microfiche reader. There are two ways for converting 35mm film into microfiche: either the film can be inserted into two track jackets which will enable fourteen pages of newsprint to be reproduced onto one microfiche or by using adhesive to fix 35mm film cut into strips onto A6 acetate sheets. This latter system is used by the BBC News library for press cuttings and enables eighteen pages of newsprint to be accommodated onto one microfiche.[7]

It was Henry Fielding who pointed out many years ago that newspapers consist of the same number of words whether there be any news or not.[8] It is for this reason amongst others that many special libraries daily cut newspapers in order to store and disseminate the information they contain. At the Consumers' Association we cut all the national dailies and provincial newspapers. After assigning subject headings they are filmed onto 16mm microfilm. Because only part of a page is filmed it is not necessary to use 35mm film. When processed the film is cut and inserted into jackets headed with the subject of the cutting. Each jacket holds a maximum of sixty frames of film and is updatable. Meanwhile the press cuttings themselves are sent to research staff interested in the subject reported upon. Anyone requiring to search through a file of old press cuttings is presented with a diazo duplicate microfiche of the file. This application I have described in more detail elsewhere.[9, 10]

Micropublishing

I have also written[11, 12] at some length concerning the efforts of commercial micropublishers. The majority of their output is limited to backruns of periodicals and out-of-print books although some interesting ventures into reproducing manuscript archives have been taking place. Of particular interest in this area is the use of colour microfiche by Oxford Microform Publications to reproduce illuminated manuscripts held in the Bodleian.

Worthy as these efforts are, however, commercially produced micropublications are often very expensive and the material required by a particular library is not always available. In these instances if a librarian requires to save space by having part of his stock in microfilm he can either film it 'in house' or have a bureau undertake the task. Having spent several years microfilming 'in house' and also using bureaux I am very much inclined to use the former. Bureaux are more expensive, often slow and some produce very poor quality microfilm. Most are geared to filming business documentation including invoices, correspondence and other office paper work. They are not in business to take the care which the librarian must demand on behalf of his customers who require very clear microfilm copies of books and journals. With a microfilming system installed in his library the librarian has at his control such things as checking headings on microfiche before filming, reduction ratios, exposure times and since the material remains in the library during the filming process it is available immediately should it be required urgently by a reader.

A particular type of material which lends itself to 'in house' microfilming is a pamphlet collection. A pamphlet can be regarded as any document which cannot be accommodated onto the bookshelves generally because it is small and does not have a spine on which to place a class number. These documents can vary from four pages to nearly 200 pages and have presented problems to librarians for many years. The usual system is to place them in pamphlet boxes. These boxes take up considerable space and require labelling. As the collection grows so more space is required and the collection within one box must be divided and the boxes relabelled. By microfilming pamphlets at regular intervals the physical size of the hard copy collection becomes constant. Jacketed microfilm means that most pamphlets can be issued as a single duplicate microfiche. At the Consumers' Association our hard copy collection of pamphlets remains at about 2,000 whilst we have a further 4,000 in jacketed microfilm. Had they not been microfilmed these 4,000 pamphlets would have been discarded and would have involved the expense of withdrawing entries from the catalogue and relying on interlending procedures to procure the items if required again.

I hope I have demonstrated that micropublishing provides a convenient method for storing and disseminating some of the existing variety of materials in many types of library. Obviously in the future we shall see an ever increasing proportion of libraries' stocks held on microfiche. I say microfiche deliberately because I believe there is no future in roll microfilm. Roll microfilm is more expensive to store than fiche. Individual pages are difficult to find and it is generally disliked by readers. Viewers for roll-film systems are more expensive and not generally portable. Roll-film is also more expensive to duplicate.

This latter point I believe to be most important since I envisage that the practice of duplicate give away or saleable microfiche from libraries will grow. Library master microfiche will probably be of silver halide film of archival quality from which inexpensive diazo duplicates will be made. It should be noted however that it is possible to make a perfectly acceptable diazo duplicate from another diazo copy. Authors and publishers will have to accept that libraries are going to operate in this way and any new Copyright legislation must see to it that recompense is made to the originators of documents. We are here talking about reproducing nearly 100 pages for as little as 3p. The Whitford Committee does not seem to have fully grasped the capabilities of this technology.

The wholesale provision of duplicate microfiche by libraries assumes a generous provision of viewers or readers. I believe this has begun to happen and will be accelerated. As a result two things will happen: firstly microfiche readers will become cheaper as economies of scale in manufacture take place; and secondly, designs will be improved. Compared with future readers existing models will look and work as well as wind-up horn gramophones did in comparison to present day stereo record players. No one single design concept will suit all users. Some readers will require the microfiche image to be presented on a screen at the office desk, others will prefer lap readers, whilst some may want the image to be projected downwards onto a sheet of paper on a table top. Although all these versions are currently available they all need improving. We have nearly thirty readers at the Consumers' Association and have at present five models in use, some of which are more popular than others.

As already mentioned we also have a camera for 'in house' microfilming. I believe that in the future we shall see more libraries with 'in house' facilities. The use of a planetary camera to produce 16mm film which is subsequently jacketed is far cheaper than using a step-and-repeat microfiche camera although prices of the latter are falling. However, the jacketing system restricts the product to 60 frame microfiche whereas the step-and-repeat type camera can produce 98 frame fiche which gives greater density of storage, and subsequently page for page duplication costs are reduced. Either 'in-house' system enables the library of any institution to undertake the micropublication of any institutional documentation such as reports, theses and out-of-print publications. This could be an important role for the library. At the Consumers' Association the library is responsible for micropublishing back issues of *Which?* certain reports and some out-of-print booklets.

So far I have dealt with the microfilming of existing printed documents. This is sometimes referred to as paper output microfilm (POM) to distinguish it from computer output microfilm (COM). The latter has been successfully used for library catalogues where the cataloguing data is held on a computer. Studies have clearly indicated that users prefer the microfiche format.[13] It should be noted that any data base held on computer can be output in this manner. The index to company registration numbers, essential to seekers of information at Companies House is available for sale on 117 fiche and is updated each month. A 21 × reduction ratio is used so that the same microfiche reader can be used to consult the index and microfiche duplicates of company files. A 48 × reduction ratio is used for the eighty microfiche used for *British Books in Print* which is compatible with most library microfiche catalogues. This venture, started in January of this year, promises to be a great success. Since it is now being issued monthly librarians and booksellers will know far more accurately which books are currently in print. It would have been quite impossible to print, bind and despatch the two large volumes which make up the hard-copy edition of *British Books in Print* at monthly intervals.

But what of 'British Books out-of-print'? Since the size of the in print volumes has remained fairly constant it means that about 30,000 British books are allowed to go out of print every year. The total number of volumes now out-of-print must number several millions. These need not be out-of-print if republished cheaply as microfiche.

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The concept of 'aboutness' in subject indexing

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Paper presented at a Colloquium on Aboutness held by the Co-ordinate Indexing Group, 18 April 1977

The common view of the 'aboutness' of documents is that the index entries (or classifications) assigned to documents represent or indicate in some way the total contents of documents; indexing and classifying are seen as processes involving the 'summarization' of the texts of documents. In this paper an alternative concept of 'aboutness' is proposed based on an analysis of the linguistic organization of texts, which is felt to be more appropriate in many indexing environments (particularly in non-specialized libraries and information services) and which has implications for the evaluation of the effectiveness of indexing systems.

Introduction

THE LITERATURE OF INDEXING AND CLASSIFICATION contains remarkably little discussion of the processes of indexing and classifying. We find a great deal about the construction of index languages and classification systems, about the principles of classification, about the correct formulation of index entries (*e.g.* the uses of standard citation orders and of chain indexing) and about the evaluation of indexes and information systems. But we find very little about how indexers and classifiers decide what the subject of a document is, how they decide what it is 'about'. The great majority of works on indexing and on information retrieval (however broadly defined) contain a statement somewhat similar to the following quotation from the PRECIS manual:[1]

> It has been found most convenient to start an explanation of PRECIS by assuming that the indexer, having examined a document, has established in his mind some meaningful sequence of words which summarizes its subject content. The manual goes on from that point to explain how such a phrase should . . . be analysed into its separate components and then organized into a string . . . (p. 4).

The basic assumption is that indexers are able to state what a document is 'about' by formulating an expression which 'summarizes' the content of the document. Indexing is traditionally seen as a process of 'summarization'. It is assumed that the relationship between a document and its index entry (or entries) is one of some kind of semantic condensation: the index entry represents a 'summary' of the content of the whole text.

The process is generally seen to involve the selection of 'key' words or phrases from the text, expressions which are 'significant' indicators of content

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and which together sum up the message of the document (e.g. Vickery[2]). This view underlies most experiments in automatic indexing and abstracting. In many it is assumed that 'key' words can be identified as those which occur most frequently in the text, disregarding the 'function words' (articles, prepositions, conjunctions, etc.) and other common words of high frequency in similar texts. Such statistical methods of extracting 'key' words have now achieved considerable subtlety and some degree of success (Salton's work[3]), but they have inadequacies which other researchers have tried to reduce by the development of other means of identifying 'significant' expressions. Indexers know from experience the value of reading prefaces, scanning chapter headings and indexes, looking at conclusions, etc., as 'short cuts' in deciding what a document is about. Edmundson[4] has experimented with refined versions of such 'hints for indexers' (following the earlier work of Baxendale[5]), selecting 'key' words from the beginnings of paragraphs, chapter headings and concluding sections, and on the basis of 'cue words' such as *result*, *therefore*, *since*, etc.

However different in approach, the basic assumption is the same. The objective of indexing (whether automated or not) is seen as the provision of an expression or of a set of 'key' words which as a whole represents a 'summary' of the document's content. This basic assumption has rarely been questioned—indeed it is rare to find any awareness that such an assumption has been made. The traditional view finds universal acceptance, namely that for the purposes of document indexing and information retrieval the 'aboutness' of a document is to be equated with some kind of 'summary' of its contents.

Why should the assumption be questioned? First, we are all aware of the inadequacies of present indexing practice and, despite impressive achievements, there is not much sign that automatic systems can or will do much better than human ones. We should be prepared to consider alternative approaches. Secondly, it is surely right to ask ourselves whether a concept of 'aboutness' which may well be appropriate in the context of literary criticism, in the anlysis of political speeches, or indeed for the purposes of abstracting—to which I shall be returning later—is necessarily equally valid in the context of subject indexing. We should consider whether a different concept of 'aboutness' might not be more appropriate in many indexing environments. Lastly, we should ask ourselves to what extent true 'summarization' is in fact attempted in everyday indexing practice.

I shall be putting forward an alternative concept of 'aboutness' based largely on a linguistic analysis of text structure, which could form a sounder foundation of indexing procedure in many contexts and which reflects more realistically the information needs of many users of libraries and information services.

Thematic structure of texts

I begin by sketching in broad outline the basic features of text structure, concentrating particularly upon the thematic organization of texts.[6]

In any sentence or utterance, whatever the context in which it may occur, there are some elements which the speaker or writer assumes his hearer or reader knows of already and which he takes as 'given', and there are other elements which he introduces as 'new' elements conveying information not previously known. The 'given' elements may be related either to items which have been mentioned earlier in the discourse or they may be related to objects or events which, in the context of the discourse, are taken to be common knowledge for both speaker and hearer (or writer and reader). Those 'given' elements relating to previous discourse are generally signalled linguistically by such devices as the use of anaphoric pronouns (*he*, *she*, *it*, *they*, etc.), definite articles, demonstratives (*this*, *that*), relative clauses (*the man I told you about*), or by simple repetition of the earlier expression. The particular means employed depends very much on the relative distance of the previous mention, the need to distinguish among similar phenomena, the demands of stylistic variety and emphasis, etc. Similar formal means are used to refer to anything taken as 'given' from the environment of the discourse: pronouns, relative clauses, deictic articles, etc. Whatever their origin we may regard the 'given' elements of a sentence as constituting its 'theme'; and those elements expressing anything 'new' or otherwise unpredictable (from the text or environment) as constituting its 'rheme'. (In this account of 'given' and 'new' and of 'theme' and 'rheme' I have had to simplify considerably a very complex area of linguistic usage—for more detail see the book edited by Daneš,[7] and the monograph by Halliday and Hasan[8].)

In the normal case, the 'theme' precedes the 'rheme'. It is natural for speakers and writers to start from what is known or can be presumed to be known before going on to impart 'new' information. It is natural to begin by saying which 'given' elements are going to be talked 'about', *i.e.* to express in the 'theme' what the sentence (as a whole) is 'about'. It is equally natural for the thematic elements, where they relate to previous discourse, to refer back to some elements of the immediately preceding sentence. In this way the speaker or writer can convey his message by a natural progressive accumulation of 'new' information. In crude terms there are basically two ways a theme may be related to a preceding sentence or clause: either it refers to elements of the foregoing 'rheme' or it repeats some or all of the preceding 'theme' (Daneš[9]). We have thus two basic types of thematic progression: linear progression (figure 1) and parallel progression (figure 2).

$$\begin{tikzcd}
T_1 \arrow[r, dash] & R_1 \arrow[d] & & \\
& T_2(=R_1) \arrow[r, dash] & R_2 \arrow[d] & \\
& & T_3(=R_2) \arrow[r, dash] & R_3
\end{tikzcd}$$

FIG 1.

$$\begin{tikzcd}
T_1 \arrow[r, dash] \arrow[d] & R_1 \\
T_1 \arrow[r, dash] \arrow[d] & R_2 \\
T_1 \arrow[r, dash] & R_3
\end{tikzcd}$$

FIG 2.

Linear progression may be illustrated by the sentence sequence:

> The boy was reading a book. It was about elephants. These animals
> (T_1) (R_1) (T_2) (R_2) (T_3)
> are found in Africa and India.
> (R_3)

Parallel progression may be illustrated by:

> The boy came home from school. First he had something to eat.
> (T_1) (R_1) (T_1) (R_2)
> Then he went off to play football in the park.
> (T_1) (R_3)

These two types of progression provide the foundations for the thematic organization of texts. Typically a paragraph or larger segment of text consists of a mixture of linear and parallel progressions starting from an initial sentence. A common example is the exposition of a 'split rheme' (figure 3).

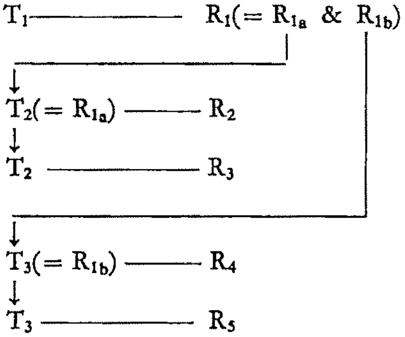

FIG 3.

This mixed thematic progression may be illustrated by the short paragraph:

> All substances are divided into two classes: elementary substances and compounds. An elementary substance is a substance which consists of atoms of only one kind. . . . A compound is a substance which consists of atoms of two or more different kinds . . .

The initial sentence $(T_1 - R_1)$ may be regarded as the 'theme sentence' for the whole paragraph, as the foundation upon which the speaker or writer builds his message. The analogy can be pursued further: the 'theme sentence' of a paragraph may be related either to elements introduced as 'new' in an earlier paragraph or to elements of the 'theme sentence' of a preceding paragraph. Clearly, we may have similar types of thematic progression among text segments much larger than individual sentences. In the normal case, we should expect the initial sentences of a text to represent the foundations upon which the writer organizes what he wants to say. The first paragraphs of a text establish, therefore, the 'theme' for the text as a whole; they express in essence what the text is going to be 'about'.

This is, of course, still only a crude picture of the mechanisms of text structure. Many other organizational principles play a role in the structuring of text;

in narratives, for example, the demands of plot and characterization, the need to depict the topographical, social and psychological settings of actions and events all play a large part in determining text structures. One structural feature common to all texts is that of semantic progression, the requirement that components of the text should be related to each other by some 'logical' connections—where the 'logic' may vary between the extremes of strict philosophical logic and of weaker common-sense plausibility. At the sentence level, the 'logic' of semantic progression requires, for example, that the statement of a condition (*if X*) should be followed by its consequent (*i.e. If X, then Y*); otherwise the progression is incomplete. At the paragraph level, the operation of semantic progression may be seen in the expectation that after a sentence stating, *e.g.* that *X has three components* there should follow sentences describing each component in turn; a failure to do so would be a violation of semantic progression. Finally at the level of the whole text, there are similar expectations of 'logical' development; one of them, for example, is that if a writer has begun by describing a particular 'problem' he will, at some later stage in the text, offer an appropriate 'solution'; another is that if some 'hypothesis' about a state of affairs has been put forward there will be described some 'tests' or arguments supporting or rejecting the hypothesis. (Such kinds of semantic progression seem to underlie a large proportion of scientific and scholarly texts.)[10]

Writers and readers: assumptions and expectations

Every speaker and writer has to make some assumptions about the knowledge and interests of his hearers and readers, whatever the context in which he may be speaking or writing. These assumptions are usually undefined and are very often purely intuitive. Nobody can ever begin speaking or writing without assuming something; nobody can ever begin from absolute scratch—even with very young children we all make numerous assumptions about what they know already. How are the writer's assumptions about readers reflected in his text? From what we have been saying the answer should be clear. The most explicit expressions of assumed or presupposed 'knowledge' are to be found whenever an author treats some elements as 'given' which he has not previously introduced as 'new' information or which he has not chosen to describe or explain in any detail. These elements he takes for granted; he assumes that anyone reading his text (or rather, anyone he expects to read his text) will already have some knowledge of the objects or events he is referring to; in other words, he presupposes a certain level of knowledge of what he is going to talk about.

The same process is at work in a less explicit way when the author establishes the thematic foundation of his text. In the initial passages of a document an author makes numerous presuppositions about the knowledge, interests and attitudes of his potential readers. He will assume a certain linguistic competence, a certain level of general knowledge, a certain cultural and educational background, and normally also some kind of general interest or inquisitiveness in the topic he is going to write about. In some cases his assumptions take on more specific and definable forms (many documents, for example, require an above average knowledge of highly specialized disciplines); these he will normally be well aware of and will take care to make explicit. But there will always be some presuppositions* that remain hidden and which become evident only when a reader does not share them.

It is not, of course, only in the initial passages of a text that an author refers to elements taken as 'given'; at any point in his text he may mention some phenomenon or event which he presumes that his readers know something about already. Nevertheless, it is in these early sections where the thematic base is being established that the author's presuppositions are most in evidence and where they have greatest effect, for it is in the opening paragraphs that the author must succeed in making contact with his readers. It is here that the reader learns the intentions of the author and how much he is expected to know of the topic already.

This brings us to the question of what readers normally expect from documents. Readers approach documents from such a variety of objectives, motives, temperaments, ideologies, predispositions and states of knowledge that any attempt to give a meaningful answer would seem to be doomed from the outset. Nevertheless, we can make certain generalizations. Leaving aside novels, poetry and other creative writings it is generally true to say that the reader of a document hopes to learn something 'new' as a result of reading it. He comes to the document with an interest, a desire or a need to 'improve' in some way his present state of knowledge. What he wants is a document which contains information that is 'new' to him and which assumes no more knowledge than he has already. These, then, may be regarded as the basic conditions which must be satisfied: (i) the information conveyed as 'new' (*i.e.* not presupposed) in the document must include some that the reader did not know before; and (ii) the knowledge taken as 'given' (*i.e.* presupposed) must be at a level lower than, or roughly equal to, that of the reader. Failure to satisfy both conditions leads to frustration or, at best, annoyance for the reader: to read something which tells him nothing 'new' is just a waste of his time, to try to read something beyond his present capabilities may produce very little from a great deal of effort. Of course, the fulfilment of the basic conditions does not guarantee that the reader will in fact 'improve' his knowledge. Many other factors may lead to a failure: the reader may not understand the author's line of reasoning, he may misinterpret some crucial point, or he may disagree with the author's argument in some area where he holds strong beliefs or prejudices. Although such failures of communication are by no means irrelevant to the activities of libraries and information services, it will be generally agreed that they lie outside the responsibility of the indexer: his concern is with the 'subjects' of documents and not with the success or failure of authors to communicate or of readers to understand what they read.

By contrast, the basic conditions for the initial contact of reader and document are at the heart of the indexing process. How do we provide the documents that readers need at a level which is appropriate to their present knowledge? We may, I think, identify two basic types of document need, although perhaps rarely encountered in their 'pure' states: one is the need felt by the reader who wants to find out more on some particular subject which he has come across—he knows very little about it and wants to learn more; the other is the need of the reader who knows quite a lot about a subject—who may even be an expert in it—who wants to know what 'new' things have been written on it. The first need will generally be satisfied by a book which starts from a foundation of knowledge roughly comparable to the reader's and in which most of what the author conveys as 'new' information will in fact be previously unknown to the reader. The second need will be satisfied by a document which, though its presupposed level of knowledge may well be considerably below the actual state of knowledge of the reader, does in fact say something that he did not know before.

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* In this paper the term 'presupposition' is used not in the tightly defined sense employed by many philosophers, logicians and (now) many linguists as the necessary antecedent or condition of a statement, but in the looser everyday sense of whatever is taken as granted.

Indexing and the needs of readers

The 'summarization' approach to indexing is clearly able to cater for the second type of document need, since the objective is to provide index entries which together represent the whole content of documents. Index entries cover not only the 'given' elements of texts but also the 'new' elements. In theory, an index user may be referred to documents from any one of the 'topics' which have been dealt with, whether these have been assumed by the authors to be known already to potential readers or whether they have been introduced as 'new' subjects. This is precisely what the reader interested in the latest developments of a particular subject wants; he wants to know which (recent) documents have treated the subject, since any one of them may potentially report something of importance for his particular needs.

But if the 'summarization' approach appears to satisfy the second type of need, it would seem inherently incapable of dealing with the first type of need. Since all elements of texts are treated as being equally significant, the entries for a particular topic in an index may refer in some cases to knowledge presupposed in documents and in other cases to 'new' information—and no distinction is made between the two kinds of reference. But what the reader with our first type of need wants is not all the documents treating in some way a particular topic, but just one document (or a small selection of documents) which can extend his own knowledge, which starts from a level of knowledge in the relevant area which is roughly comparable to his own.

What I am suggesting, therefore, is that for this type of document need an index system should work with a definition of the 'aboutness' of documents which is formulated in terms of the knowledge presupposed by the authors of the texts. If index entries express this kind of document 'aboutness' then the basic conditions mentioned above for reader–document contact should be met: the user of the index is referred to documents on a topic about which he knows roughly what the authors of those documents presuppose of their readers, and he can seek out the documents (or just one of them) with some confidence that he will in fact learn something 'new' about the topic. (He will not be referred to documents where the topic is not one of the basic 'themes' of the text.) He is thus brought into contact with documents which have the potential to enlarge his present state of knowledge—even if for other reasons which we have mentioned they do not in fact succeed in doing so. In essence, an index system based on such a concept of 'aboutness' would lead the reader (index user) from what he knows already to what he does not yet know; it satisfies his need for information whose nature he cannot define (because he does not know what it is) by referring him to texts which progress from already familiar territory.

Objectives of indexing

This concept of 'aboutness' would clearly be most appropriate in those information services where indexers are unable to specify precisely the kind of readers they are serving, *i.e.* in general public and academic libraries and in national bibliographical services. In these contexts it is not possible to make any general assumptions about the cultural and educational backgrounds of readers. The 'summarization' approach, however, requires indexers to formulate some notion, however vague, of the typical or 'ideal' user of the index system. Summarization cannot be completely neutral: the indexer must make some assumptions about what aspects of a text will be of interest to users, he must take into account the general or average knowledge of users. This is because in producing a 'summary' the indexer is in effect producing a kind of 'text', and like the author of any text he must 'write' for a particular audience; he must have some image of his recipient and 'compose' with him in mind.* By contrast, the 'presupposition' approach to 'aboutness' (as we might call the concept I have been describing) does not compel indexers to make any assumptions about the general knowledge or cultural background of a 'common' or 'ideal' reader. The indexers' task is to establish and record the topic or topics which the authors of documents themselves assume their readers should be starting from; they are required only to take account of the authors' own assumptions about their ('ideal') readers; they do not have to formulate their own image of readers. In this way, in theory at least, any 'interference' by the indexer between reader and documents should be minimized.

In the context of the special library and similarly specialized information services, the 'summarization' approach to subject indexing is most appropriate. Indexers are generally able to define clearly the interests and levels of knowledge of the readers they are serving; they are thus able to produce 'summaries' biased in the most helpful directions for their readers. More importantly, indexers can normally assume that most users are already very knowledgeable on most of the topics they look for in the indexes provided. They can assume that the usual search is for references to all documents treating a particular topic, since any one may have something 'new' to say about it that the reader did not know before. The fact that some references will lead users to texts which tell them nothing they did not previously know should not normally worry them unduly —it is the penalty they expect to pay for the assurance that the search has been as exhaustive as feasible.

It might well be objected that if the 'presupposition' approach to document 'aboutness' were followed, indexes would be no longer capable of satisfying the exhaustive search, the need for references to all documents on a topic. This would indeed be so, but one may legitimately ask whether present indexes based on a 'summarization' concept of 'aboutness' succeed in this aim. The evidence of most tests of the effectiveness of indexes in information retrieval[12] would seem to demonstrate that exhaustiveness can be achieved only at the cost of the retrieval of an unacceptably large amount of irrelevant material and that any attempts to reduce the volume of 'dross' usually result in the failure to retrieve some material which is relevant to the topic sought.

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* I have given elsewhere a fuller description of the linguistic processes of 'summarization' in indexing.[11]

In any case, should indexes be attempting to provide for such a need? Is it not better covered by the abstracting services? Abstracts are specifically intended as 'summarizations' of the contents of documents; they are designed to inform users what the authors have to say on a particular topic. From an abstract the user seeking 'new' information about a subject can usually decide whether the document referred to will in fact satisfy his particular need. Where good abstracts exist there would seem to be little justification for an index to attempt to cater for the exhaustive search. Only where an information service operates in a specialized field not covered satisfactorily by abstracts can there be a sound case for indexing in depth based on the 'summarization' approach.

Conclusions and implications

My general conclusion is that in most contexts indexers might do better to work with a concept of 'aboutness' which associates the subject of a document not with some 'summary' of its total content but with the 'presupposed knowledge' of its text. The 'summarization' of document contents is best left to the abstracting services and to those specialized libraries and information services where depth indexing is feasible and justified by the document needs of the readers they serve.

What would be the practical effects of a change of attitude to document 'aboutness'? It can be objected that it is surely no easier to establish the knowledge an author presupposes of his readers than it is to make a summary of a document's content. This is probably true; the indexer has an equally difficult task with either approach. The difference is then only one of the purpose and objectives of indexing: how do we bring together readers and the documents they need? What kinds of need are we trying to satisfy? If it is agreed that most readers (in a particular indexing environment) want just one or two documents on a topic at a level which is appropriate to their present knowledge of the subject, then indexers should take the 'presupposition' approach to 'aboutness'. How would indexers discover what knowledge authors presuppose? From the description above it should be clear that they would look most closely at the early passages of a text where the author lays the foundations of what he is going to say. They would look, in other words, at prefaces and introductory sections of texts. But this is what the great majority of indexers do at present; in deciding what a text is 'about' they rarely feel the need to look beyond the introductory passages of a document. Even though they intend (consciously or not) to 'summarize' the content, what they do in fact may be very similar to what I have been describing. If (to give a crude example) an author says that 'this book is about industrial archaeology', the indexer will generally assume that this probably represents a reasonable summary of its contents. But the phrase 'industrial archaeology' is also an expression which the author assumes his readers have some knowledge of already; he presumes that they have some concept of what 'industrial archaeology' might refer to, and that (more importantly) they have an interest in learning more about it. Thus both approaches to indexing would result in the same index entry *Industrial archaeology*.

The difference then is less one of practical procedures and more of general attitude to the objectives of indexing. A change to a 'presupposition' concept could for instance affect the way we evaluate the effectiveness of an indexing system. The now traditional parameters of 'recall', 'precision' and 'fallout' are clearly valid for systems in which success is measured in terms of the ability to retrieve all documents which have something to say on a particular topic—that is to say, in systems based on the 'summarization' approach.* But where this is not the case we need perhaps different parameters. Other measures of effectiveness must be identified for systems in which success is achieved if the reader obtains one document which is genuinely capable of enlarging and enriching his present state of knowledge and where readers do not want to have documents that tell them nothing they do not know already or that start from a level of knowledge they do not possess.

The emphasis in most writings on information retrieval has been on the specialized services catering for the exhaustive search, where the 'summarization' concept of 'aboutness' is quite appropriate. Perhaps we should now examine more closely the general information services where the needs of users are different and where the concept of 'aboutness' I have been describing may well be more relevant.

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* This includes most experimental systems of automatic indexing; in the contexts in which they are designed to operate the 'summarization' approach is clearly most appropriate.

'Aboutness' as a strategy for retrieval in the social sciences

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The 'aboutness' model

Indexing systems have traditionally been geared to cater for search requests of the form 'documents about . . .'. It is far from clear what is meant by the notion 'about', but the model that guides indexing is built around it.[1] The procedure is:

(1) indexers label and group documents according to what they are about;
(2) searchers formulate their requirements according to what the sought-for documents are about;
(3) search requirements are then matched against the documents in a system.

In this way the indexer aims to enable the searcher to trace the material he seeks. It is important to understand that this model is based on an assumption at its most extreme that what a document is 'about' is a self-evident function of the document itself. It also entails a belief that what the document is 'about' is the basis of the search.

It is more or less axiomatic that systems based on this model are of limited effectiveness in the social sciences.[2] Searchers are liable to miss documents they would want if they were aware of them. This is because search prescriptions of the form 'documents about . . .' limit the documents that can be defined into a statement of search requirements. Such a prescription is often an inadequate statement, if not a misdescription of the material a searcher could use. The acid test of the truth of this statement is to check the proportion of the items in the citations appended to books and articles that can be characterized as being 'about' what the author takes as the object of his writing. That many of the items cited cannot be so characterized casts doubt on the 'aboutness' model.

Without denying the usefulness of such systems for the kind of searches they aim to support, the Information Research Group of the Open University has come to the view that they are unduly restrictive, at least as a means of searching the social science literature. Experience in working with social scientists leads us to believe that there is room for indexing systems based on a somewhat different model, which aim rather to give searchers a choice of ways of approaching the literature.

Aslib Proceedings, 30 (5), May 1978, p. 182–187. Printed in Great Britain.

Examples of searches

We can best explain what we see as the problems with the 'aboutness' model, and the nature of the alternative model we have adopted, by examining some of the kinds of searches social scientists may wish to carry out. The following are possible searches framed in connection with a proposed Open University course on recurrent education:* recurrent education in Germany; learning experiences of adults; participant observation in study of adult learning experiences; recurrent education as innovation; education from cradle to grave; recurrent education (in Marxist perspective) as social reproduction. In examining them, we shall consider the nature of required documents in the light of the documents obtainable by search prescriptions of the form 'documents about...'.

Search No. 1. Recurrent education in West Germany

Searches of this kind, concerned with a substantive topic, can readily be thought of in terms of what required documents are to be about. The required set may be defined as those documents about recurrent education which are also about Germany (or vice versa). However, this set would not necessarily contain all required material. For instance, it would exclude accounts of arrangements like paid educational leave (which might be central for the searcher), unless authors had viewed them as components of a recurrent education system. The searcher would not even be referred on to terms such as paid educational leave, because there is no necessary relation with the notion of recurrent education. The searcher would read this relationship into the material.

Search No. 2. Learning experiences of adults

This search could also readily be expressed in the form 'documents about . . .'. However, it is far more open to differences of interpretation than the preceding one. Different searchers would be likely to want vastly differing sets of material. There are many ways of thinking about topics like this. Depending on the viewpoints they adopt and the kinds of question they decide to address, so searchers will wish to call on different bodies of research (*e.g.* self concept and achievement). A set of material defined as documents about learning which are also about adults would at best serve only as a starting point. In pursuing the search further, the searcher will receive no help from the system. Further material would have a place in the required set by virtue of the fact that it would provide data to be viewed in terms of the light it may throw on adult learning experiences, a use of the data which in no way automatically follows from it and may possibly be quite other than that of authors.

Search No. 3. Participant observation as a method for research into mature students

An 'aboutness' request would be for documents about mature students which are also about participant observation. Required material in this case is not

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* We discuss them against the background of an actual search of the ERIC (Educational Resources Information Center) system. ERIC was computer searched, on descriptors and texts (titles and abstracts), on recurrent education and associated terms, with an output of several thousand items. Such a set would be too large for any academic to cope with, and the search therefore raised the general problem of the need to find ways of focusing down on to specific course topics in a situation of this kind.

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altogether appropriately defined in terms of what documents are to be about. In particular, such a statement excludes documents reporting studies carried out by means of participant observation—*i.e. using* the method as distinct from *discussing* it. Such material is often of more practical value, irrespective of the population studied, than documents about participant observation, in that it exemplifies the nature of a method and allows assessment of its strengths and weaknesses.

Search No. 4. Recurrent education as innovation

The emphasis in this search would be on the process of innovation, and factors which may enter into it in the recurrent education situation. Given this emphasis, it would not be helpful to restrict the search to documents about innovation which are also about recurrent education. Studies of innovation in other contexts might be of especial value in suggesting ways of explaining successes and failures of attempts to realize the notion of recurrent education. The choice of such studies would be likely to differ from one searcher to another, depending on the aspects of recurrent education on which they choose to focus. The documents would, however, all be members of a class of material identifiable as innovation studies, as contrasted say with descriptive accounts of the changes to be made to the administrative framework of education, a distinction impossible to make in 'aboutness' terms.

Search No. 5. Education from cradle to grave

The 'cradle to grave' notion is often found in conjunction with the notion of recurrent education, but is also separable from it, and might be taken up in more generalized discussions of future directions for the development of educational systems. The required set would cut across almost all aspects of educational systems (e.g. aims, organization, pedagogy). This search is thus impossible to formulate in terms of what required documents are to be about. The required material is best defined as a subset of documents contributing to educational policy thinking, which are distinguished by their radical orientation.

Search No. 6. Recurrent education (in Marxist perspective) as social reproduction

The basis for this search would be the view that education operates to maintain the existing social order, and that education can only be changed after the productive relations of society have been changed. The purpose would be to trace studies providing insights which could be employed in the analysis of recurrent education. As such the requirement in terms of what documents are to be about is that the situations under study be analogous to recurrent education, the judgment on this point being a matter for the individual searcher. The key consideration moreover is the requirement as to perspective. Comparably with the participant observation search, the documents of interest are not those *about* Marxism but those which *employ* a Marxist perspective. The notion of 'about' does not take account of this way of characterizing required documents.

Problems

It is not difficult to see how searchers come to miss material that would be helpful to them. All of these searches could be expressed as requests for 'documents about . . .'. Required material, as we have seen, will not necessarily be about what the search is about, but can be thought of in this way. However, in doing so, the searcher will often be using the term 'about' very differently from the way it is used, in indexing, to determine how documents will be labelled and grouped. When this is the case, the sets of documents in the system will lack consonance with the sets the searcher wants to trace. It could be argued that the searcher has the option of formulating his search prescription broadly or specifically, and hence of defining a set which contains his required material even if he cannot focus directly on it. This is, however, to oversimplify the issues.

Thus, for instance, to make a distinction between studies of innovation and innovation studies in the 'recurrent education as innovation' search may seem merely precious. There is at least a practical justification for it in large systems where an 'innovation' set would be too big for a searcher to cope with. But the relevance of this kind of distinction is not confined to large systems. The term for a class of studies, unlike the innovation example, may not coincide with what the documents are about (*e.g.* many studies of self concept and achievement, mentioned in the context of the 'learning experiences' search, represent a tradition of work centring around and known by its use of the notion of the self-fulfilling prophecy). In the same way, the absence of needed cross references, noted in the first two searches, can on the face of it be overcome by a little thought on the searcher's part as to further terms to include in his search prescription. Yet there are some searches, as we found in the later examples, where it is possible to specify only the kind of information required, not what a set of required documents will be about. In short, systems based on the 'aboutness' model fail to be sensitive to the variety of ways in which social scientists characterize work in their field, and hence to what may count as a set. If it were simply the case that the searcher obtains more material than he requires and has to discard unwanted items, this would not be too serious. However, as we have seen, the problem is rather that wanted items are missed, possibly whole classes of material. This *is* serious, particularly since the non-retrievable items are ones likely to provide new insights or information, and are consequently the ones the searcher would often be most anxious *not* to miss. The seriousness of this problem is not always appreciated. Loss of required material is an aspect of the retrieval situation which does not become evident except in working with subject specialists in the field concerned. Evaluation studies tend to gloss over it, either because they are carried out on preselected test collections, or because they are carried out in real collections too vast to be scanned by searchers for items missed. Moreover, in both types of study the representativeness of the test searches rarely comes into question.

Alternative model

Given the difficulties arising from the differing uses of the term 'about' when search requests are forced into the form 'documents about . . .', this term is of very limited practical value as a basis for retrieval in the social sciences. The underlying problem is that what a searcher means by such a statement, and consequently how he wants documents labelled and grouped, is a function of how he views the situations he studies. This is in turn a function of the differing frames of reference he finds it appropriate to employ in studying different situations. The notion of indexing documents according to what they 'are' about thus becomes impossible to sustain.

A more fruitful approach is one in which the principles according to which searchers are allowed to define required material are 'made problematic'—*i.e.* a matter for investigation rather than to be taken as given. Documents may then be labelled and grouped according to these principles so as to make them readily relatable to search requirements. It is plain that in the social sciences no single way of characterizing documents will serve in all search situations There will be many ways of characterizing any document. For this reason we must use what may be called a multi-modal approach.

This model assumes a very different view of the search process from the 'aboutness' model. Whereas the 'aboutness' model posits a process of matching documents and search requirements as the means by which searchers trace material that will help them, the logic of our argument suggests that searching in the social sciences must necessarily be an open-ended process. There are clearly implications for search strategies, which we shall not enter into here, except to say that our general conception is one of searchers differentially interacting with the documents in the system. This is in strong contrast to the relatively mechanical process of matching which is assumed by the 'aboutness' approach. Because this paper has focused rather on search requirements as related to index structure (*i.e.* the labelling and grouping of documents), we shall conclude by describing the way we have operationalized our model.

The general procedure[3] is that the indexer takes a clearly defined range of viewpoints in turn (*e.g.* theoretical orientation, method of research), and generates a set of title-like phrases for each document, each phrase taking a different aspect of the document as its focus but referring to the whole. The phrases associated with each dimension of the system are presented as separate series (separate indexes as it were), each organized according to its own set of headings chosen for relevance to the viewpoint employed. Thus, for example, pieces of research employing a common theoretical orientation are grouped together, and the title-like phrases give further information about individual items which enable searchers to select from them according to their purposes. The headings on a given dimension may represent a number of different ways of characterizing documents as sets. For example, headings on the theory dimension of the system may represent types of approach (*e.g.* structural functionalist), discipleship (*e.g.* Durkheimian), content of theory (*e.g.* socialization), and so on. The effect is to identify different sub-populations of documents within a collection, and to index each separately according to the ways in which searchers may wish to access it. The searcher thus has a choice of approaches, and can vary his approach according to the nature of the task in hand. Hence he has a better chance that the documents he traces by means of the index are the ones he would choose if he could survey all the documents themselves.

Conclusions

The conclusion we have drawn up from our work is that there must be serious reservations about indexing in terms of 'aboutness', and that it is possible to employ an alternative approach which greatly extends the search capability of an indexing system. It can be argued in opposition to this position that indexing in terms of aboutness *is* indexing, and that the reason for any failure of the intellectually aseptic matching process described in our opening paragraph lies in the immaturity of social sciences and educational theory, which hence are not good enough for effective indexing. Even if that criticism represented a valid position in the philosophy of science, it is an inadequate justification for the appropriateness of the 'aboutness' model as a basis for systems which will help searchers to trace required material *now*.

Moreover, whilst searches which do not conform to the assumed pattern have been carried out by informal means (like asking a colleague), such sources are increasingly less to be relied on as the volume of material published becomes greater. Searchers are likely to be forced either to turn to indexing systems for their means of access to the literature or to give up the attempt to cover it effectively. They may choose to do the latter, but it should be their free choice, not a matter of Hobson's choice. Analysis of searches of the kind we have attempted suggests that the 'aboutness' model is to be seen as a serious oversimplification of the retrieval process with consequences which will become increasingly apparent and unacceptable.

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1 Cf. '... the key decision in the indexing procedure concerns whether a document is *about* some subject. It is at this point that we get hung up because of the difficulty in saying exactly what "aboutness" means'. MARON, M. E. On indexing, retrieval and the meaning of about. *Journal of American Society for Information Science*, 28 (1), 1977, p. 38–43.

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3 For a more detailed account, see SWIFT, D. F., WINN, V. A. *and* BRAMER, D. A. A multi-modal approach to indexing and classification. *International Classification*, 4 (2), 1977, p. 90–4 A. sample index constructed along these lines is available on request from the authors.

BRIEF REVIEWS

CAMBRIDGE INFORMATION AND RESEARCH SERVICES LTD, *Compilers.* Sources of European Economic Information. 2nd ed. Farnborough Hants, Gower Press, 1977. 266 pp. (ISBN 0 566 02007 6.)

There have been several improvements on the 1974 edition of this source. The 2452 bibliographic sources are detailed, including official and commercial publications, giving statistical information, market data, manufacturers, research, etc. This compares with 1452 entries in the earlier edition. The layout has been improved and the subject index is more detailed (although still rather difficult to use). Sources for Iceland have been added so that 17 West European countries are now covered.

The first section (p. 3–149) is arranged by country, including an international section and gives bibliographic details including language, but does not give price except in the case of Great Britain. The annotations are a very helpful guide to contents. The addresses of the publishers are given in the following section (p. 153–210). The majority of entries are for periodical, often annual publications. Monographs are mainly recent although a few of the forecast publications were published in the early 1970s and before. There are two indexes: an alphabetic list of sources by title and a subject index. Eight broad subject areas are given and the fifth of these, industrial and service sectors, is further divided by industry. The subject sections are then subdivided by country.

WASSERMAN, P. *ed. Consultants and Consulting Organizations Directory: a reference guide to concerns and individuals engaged in consultation for business and industry.* 3rd ed. Gale Research Company, Michigan, 1976. 1034 pp. (ISBN 0 8103 0562 3.)

Consultancy is a rapidly changing and expanding field throughout the world and the appearance of a new edition of any directory in this field is a welcome one. Even in this expansion situation, the total number of entries in the new edition of this directory has increased by less than 6 per cent to 5,314. The amount of information given for each entry is good, including the names of principals in each firm. Telex numbers, if available, would be a useful addition for the next edition. The publishers suggest that this directory should be used in conjunction with their publication *Who's Who in Consulting* (2nd edition, 1973) which is still available. As with earlier editions, *Consultants and Consulting Organisations* is to be supplemented periodically by *New Consultants.* This will prove to be a useful publication for those interested in consultancy. However, it has a strong American bias.

Aslib Proceedings, 30 (5), May 1978, p. 188–189. Printed in Great Britain.

YOUNG, M. L., YOUNG, H. C. *and* KRUZAS, A. T. *eds*. Directory of Special Libraries and Information Centers, Vol. 1, 4th ed. Gale Research Company, Michigan, 1977. (ISBN 0 8103 02896.)

The previous edition of this directory was published in 1974, and although it was updated by supplements, there has been much revision involved in the preparation of the 4th edition. The editors estimate that about 3,000 new files have been added and there have been deletions and amalgamations. The 4th edition contains 13,940 entries (12,540 in the USA and 1,459 in Canada) compared with 13,078 in the 3rd edition. There are brief entries for defunct libraries. In addition, there are cross references from previous names, libraries which have merged and some initials and acronyms.

As well as names and addresses, the entries give information on subjects, stock, services available, publications, staff, affiliations, and founding date. Two new categories of information are affiliation to a network or consortium (a list of these forms an appendix) and use of automated library systems including on-line services. There is a subject index at the end of the directory. The majority of libraries included responded to the editors' updating questionnaire but a few entries, marked with asterisks, come from secondary sources. Volume 2 is the *Geographic personnel index*.

Computer assistance in the editing and typesetting has reduced the size of the directory considerably and the entries are clearer to read.

The 4th edition will be updated periodically by *New Special Libraries* (special subscription).

A separate publication *Subject Directory of Special Libraries and Information Centres*, in five volumes breaks down the information given in the above directory into the five sections: Business and law libraries, education and information science libraries, health sciences libraries, social sciences and humanities libraries, science and technology libraries.

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The Information Worker: identity, image and potential: proceedings of a one-day joint Aslib/Institute of Information Scientists conference, London, 22 November 1976; edited by Margaret R. Raffin and Rona Passmore. iv, 58pp. (ISBN 0 85142 099 0)
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Aslib Proceedings now accepts contributed papers in addition to those presented at Aslib meetings and conferences. They should be of a practical nature and of some relevance to problems encountered in the everyday operation of library and information units, or services. Other kinds of contribution which will be considered for inclusion are short notes on new information units or special libraries; the introduction of new techniques or systems in existing libraries where these may be of general interest; equipment designed by members for special purposes and put into operation in their own organizations; and objective reports on experience with new 'packaged' commercially available information services.

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Leo Jolley: a short appreciation

Kevin P. Jones

Chairman, Aslib Informatics Group

Paper presented at the Leo Jolley Memorial Seminar, 20th June 1977

USING his *Information Scientist* pseudonym of Icarus, Alan Gilchrist[1] once called the Aslib Co-ordinate Indexing Group (CIG) (now Aslib Informatics Group) a bunch of free-thinkers—the hippy fringe of the information profession. As the leading light of this Group (Leo Jolley was its Chairman from its formal inception in 1970 until his death on Christmas Day 1976) one might have expected him to epitomize these alleged qualities, but this was not so. Leo was neither long-haired, figuratively or otherwise, nor was he a particularly free-thinker. His work relating to information retrieval tended to be highly formalized: for a time he was unjustly criticized[2] for his attempt[3] to rigorously define the fundamental nature of feature card systems. Later he had to suffer similar criticism from the present writer when he attempted to define and standardize[4] the vocabulary relating to co-ordinate indexing and thesaurus construction. Leo was a highly individual thinker, however, and he certainly existed at the fringe of the information profession. His contacts with the profession appear to have been limited to the CIG and to the Classification Research Group. He was neither a member of the Institute of Information Scientists nor of the Library Association, and was affronted if accused of being a librarian. Thus, he formed a part of that limited band who have contributed much to the profession without really being a part of it. This must be qualified, however, in that he had established a company (J. L. Jolley and Partners) which operated a range of services from consultancy to punching holes in feature cards.

Leo Jolley had developed an unparalleled expertise in the handling and exploitation of feature cards. Much of this expertise is displayed in his highly successful book *Data Study*.[5] He was amongst the very few who took the trouble to rigorously explore the mathematical basis of the feature card system, and then re-exploit this knowledge as a teaching aid for set theory. To Jolley, feature cards were far more than merely the skeleton upon which an information retrieval system could operate. They could form a means for plotting sales distributions or archaeological remains, or for answering examination questions (and subsequently for rapidly marking them), or even as an original way of saying 'Merry Xmas'. The recipient received two cards bearing apparently random hole punchings, but when superimposed the appropriate greetings appeared. Many systems were installed to provide access to material in school resource centres. Leo's ingenuity even stretched to the design of machines which could count the number of holes present in a feature card or feature

Aslib Proceedings, 30(6), June 1978, p. 192–196. Printed in Great Britain

card combination, and ultimately one which could translate paper tape into feature-card postings. The former machine assisted statistical analyses—an area of great interest to him. Most equipment suppliers have concentrated on drilling systems for feature cards and some complex and expensive machines have been marketed. In contrast, the Jolley organization remained firmly wedded to hole punching using a simple, robust and inexpensive punch. This provided a far quieter system than drilling. The success of hole punching may be gauged by the fact that the Jolley organization is virtually the only concern to offer a contract service for producing holes in feature cards. The firm also operated residential introductory courses based at the Bell Hotel in Aston Clinton, yet this activity did not inhibit Leo from giving his time to running CIG courses which must have undercut his own organization's activities.

Leo was extremely generous with his time which bore a direct relationship to his capacity to earn. Money was clearly no more than a necessary evil: this may be illustrated by his casual remark made about housing developments which had taken place near his home in the Chilterns. He castigated his new neighbours for being rich.

Jolley's interest in the theory of integrative levels appears to have arisen through his consultancy activities where he discovered the same problems in designing retrieval systems in widely differing environments. Thus, the development of a coherent general system appeared to offer the means towards reducing effort, and it is vital in any assessment of Jolley's application of the theory of integrative levels to remember that he found the system so developed to be capable of saving him both time and effort. It would be extremely harsh to call this judgment into question. Whatever the value of *The Fabric of Knowledge*[6] may be to others, there is no valid reason to suspect that it was not highly useful to its creator.

Leo should have presented an extended account of what became *The Fabric of Knowledge* at the First Ottawa Conference on the Conceptual Basis of the Classification of Human Knowledge in 1971, but was prevented from doing so through his wife's serious ill-health (she subsequently died of cancer). Robert Fairthorne presented the paper instead. Therefore, although the cause had tragic implications, the CIG was particularly fortunate to hear the first extensive, public account of the system from its originator. This was at the CIG's 1972 annual conference in Churchill College. Cambridge was held in very special affection by Leo. He had been an undergraduate at Downing College during the immediate pre-war and early World War II period—a period of enormous change. Leo had advanced from humble origins in Manchester via scholarships to the famous Grammar School and thence to Cambridge. Apart from an initial shock in finding that the proctors expected gentlemen who owned aeroplanes to report this fact, Leo appeared to enjoy his undergraduate days even once they had declined into a part-time occupation during the war when agricultural labouring in the fields around Cambridge became the main activity. Leo always yearned to return to this initial source of inspiration. An obvious thread in his development of the theory of integrative levels is that the theory was first expounded by Dr Joseph Needham in Cambridge during 1937. Leo always expressed his debt to Needham's inspiration usually by citing his *Time the Refreshing River*.[7]

To return to 1972, Churchill College provides the rare combination of opulence and modernity: the main lecture theatre is magnificent and fortunately possesses an inexhaustible supply of blackboard. Leo began his lecture[8] by examining his lowest level, namely the set theoretic, in considerable depth. At this stage it was not clear whether this was merely forming a part of his earlier comprehensive introduction to the structure of feature cards, or was simply a thorough examination of the lowest integrative level, or was intended to form an introduction to the framework for the whole system. Nevertheless, it soon became apparent that the last named was the essential element. This is in direct contradiction to Professor Kilmister's preface to *The Fabric of Knowledge*, where he makes a plea for a classification to be based on mathematical principles! In the verbal presentation it became obvious that the essential feature was the mathematically developed coding base of octal groups. Jolley's interest in coding patterns had been displayed in earlier studies of employing polygraphs in feature-card systems and it should not be surprising to find that the coding element played a major role in his work on classification.

One year later Leo gave a slightly more extended presentation at Informatics 1 in Trevelyan College, Durham.[8] Once again one gained the impression that the rigid, mathematically derived base was the *essential* feature. If it is not—how otherwise could Jolley claim that his system is capable of demonstrating gaps in the pattern of knowledge. Two other features remain ingrained in the memory. One is the trivial observation that the binary numbers grew longer and longer as the presentation developed; hence the requirement for a copious supply of blackboard. This was a trifling feature as Jolley never intended this code to act as a notation in the sense that notations are used in bibliographical classifications. The other observation may appear to be trivial at first, but was in fact an inherent weakness: the space/time allotted to the upper end of creation, man and his artefacts was insignificant compared with that granted to the cellular and molecular levels. One gained a distinct impression of acceleration: the description of human institutions was accomplished in a fraction of the time spent on the sub-atomic levels. This is also evident in the work of Teilhard de Chardin[9] where one ultimately senses that the author intends the reader to feel himself and the rest of mankind to be racing heavenwards; yet most of the evidence is also presented from lower levels of creation.

With all the blackboards filled and slightly late, the audience stumbled out for coffee feeling that they had either witnessed a miracle of compression or that they had been deceived in some way: not in any fraudulent sense as Leo was both transparently honest and highly diffident about the power of his artefact, but deceived in the perceptory sense.

The mathematical base is both a source of great strength, but ultimately a cause of weakness. The strength arises in the evident, fundamental framework and equals the Dewey decimal system in inherent simplicity. Nevertheless, it must be stressed that this base was never intended to act as a notation in the library sense. The system was sufficiently rigid that in fully developed versions it should be possible to postulate where gaps in knowledge may occur. The *Fabric of Knowledge* resembled the techniques which have been developed for morphological analysis—a branch of technological forecasting which is dedicated to assessing the fundamental elements of technological processes.

Ultimately these suggestions become self-destructive. If a classification is 'perfect' then the innovative process must be strictly finite as the whole of possible future knowledge would be capable of being laid bare. This is where the deception lies. Many others have followed this road since the time of Bishop Wilkins and many more will be tempted to wander off in the same direction in future. It is very doubtful if man does have the power to unlock all the mysteries of his environment, and even if he had it is highly probable that he would modify this environment in the attempt, thus ever lengthening the process.

Having attacked the framework, the integrative levels may appear to remain as beacons, but even here it is possible to query both the categories and the order in which they occur. Does the whole of creation really rest upon mathematics and in particular, on set theory? Surely set theory is no more than an extremely useful artefact. Further, there is the problem that many things may co-exist at different levels simultaneously: the hand which pushes the pen as part of a commercial activity also exists on the biomorphic and sub-atomic levels. Indeed the interdependence of man and his environment is a major feature of contemporary thought.

Although I have tended to attack the fundamental nature of *The Fabric of Knowledge*, I hope that this will not be interpreted either as any lack of respect for the man or even for his work on integrative levels. Despite the many flaws it remained a personal *tour de force*. It was not the product of research grants, or even of long vacations, but was the cumulative result from efforts snatched in odd moments amidst a busy life. Journeys up to Marylebone for Aslib meetings provided some time. It is fitting that the old Great Central Railway provided the setting for some of this work as this railway had had enormous ambitions (these included Paris via a Channel Tunnel) and was magnificently constructed.

It would have been easier to have assessed Leo Jolley's massive contribution to co-ordinate indexing, as much of this lay beyond criticism. Fortunately he was able to express his ideas in his excellent *Data Study*[5] and in a *Progress of Documentation*[10] review. Unhappily the latter, through no fault of his, had to be rushed. Too often Leo was denied sufficient time to produce a well-finished piece of work. In this case Leo agreed to write a review when another failed to meet a deadline. Nevertheless, Leo Jolley always sought to apply rigorous standards to all his affairs. This led to commercial success in punching feature cards. This led to extreme clarity in his fundamental approach to the exploitation of feature cards, particularly in his techniques for coding based on polygraphs. In vocabulary control his general thesis was correct—terminology gains from being standardized, but he sometimes failed to appreciate that the terminology of co-ordinate indexing had to interlock with that of librarianship and information science. The mathematical basis of his work on integrative levels is lucidly clear: unfortunately this clarity was sometimes achieved through what appears to have been a distorted view of the universe. Leo Jolley considered his work on integrative levels to be of much more lasting value than some of his more mundane occupations. He would certainly have wished this work to be commemorated—even at the cost of some partially critical contributions. If more time had been granted to Leo there is no doubt that he would have been able to surmount some, but not all, of the reservations which have been raised.

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Outline of Leo Jolley's holotheme

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MOST OF US knew Leo Jolley at Aslib or through his writings only, so we are grateful to Kevin Jones for telling us of his career. We are not surprised, because Jolley's own presentations made it clear that they arose from long experience and deep thinking. Here lies my difficulty. It is my task to outline his theory the of holotheme, but no one could do it better than he nor, indeed, as well. So I will recommend to you his contribution *in absentia* to the Ottawa Conference of 1971.[1] Admittedly his writings are concentrated. He had what is sometimes called the mathematician's approach to prose. The writing is coherent, but every sentence is meant to mean something and something different. This leads to clarity, but it does demand attention and thought. His style certainly sharpens his arguments and the impact of his apt and often witty examples. I will indicate in what field of endeavour his work lies, and then go over the salient features of his grand design.

To begin, we must be quite clear that he deals with notions, not with texts as such. It is assumed that, if texts are the source of the notions that are to be arranged, these notions are already known. Thus, one of the great problems of our group, and others, what does a document speak of and what does it speak on, is outside the scope of his procedures as, indeed, it is outisde the scope of most classificatory schemes. The problems he deals with arise when you have the notions concerned lying around in front of you. I will not define 'notion', but just say that they are the kind of entities people talk and write about. The arrangement of notions is a long and very necessary activity. One cannot take everything as a special case, so that general principles never apply. It takes up too much time and space, and demands an impossibly good memory of everybody. The general principle, or belief, behind all systems for the arrangement of notions is that of self-similarity; as above, so below. Its main trouble is that it can be very arbitrary. It is plausible to believe that, at some stage or level of concept, one can change over to new units and still observe the same pattern between the new units as between the old. Certainly it seems to work. Unfortunately it works anyway you like, provided you do not specify the range over which it is valid. In mathematics one can conceive indefinite self-similarity. For instance, there are the Peano or 'snowflake' curves, and their progeny. In these, every straight line is replaced by a jagged line and every line of the jagged line replaced by a jagged line of the same shape but smaller, and so on indefinitely. This results in a figure with various interesting and unlikely properties. Sometimes in real life you can go on in this way, but

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not indefinitely. Consider a good map of a rugged coastline, *e.g.* Brittany. If you magnify a part of this, it looks the same. You can go on doing this, and the part is still similar to the whole. But a time must come when the units of geography have to give way, and pebbles take over. Similarly with classificatory trees and branches. When do branches stop belonging to the same tree and, going up instead of down, when do the branches become distinct trees?

Leo did not first study the theory of this problem. As I said, he worked from observation. Seeing a pattern emerge, or trying to find a pattern to fit, he evolved his procedures. Only in the last years of his life did he begin developing a theory, and this theory was unfinished.

Broadly speaking, the pattern he observed is this. He distinguishes eight levels of notions ranging from logically simple mathematical ideas, such as semi-groups, at the bottom, through the ideas of atoms and molecules and more and more complex notions to those of the United Nations and such at the top. He tried out chains of notions going from the less to the more complex, and found that different levels of organization appeared regularly. At each level the compound notions of the level below become its sub-elements. This is common ground with most applications of integrative levels of which, perhaps, the most important feature compared with traditional classificatory procedures is that they build up, not tear down. They are synthetic, not analytic.

Jolley then divided the elements of any level into two groups. One contains notions of objects; entities bounded in space or time. The other, substances. The distinction is between the idea of an atom of copper, and copper as a substance. His approach to this is typical of his approach to many of the problems that plague classificationists. I sometimes wonder whether his approach to these problems may not prove a more valuable contribution than his grand design itself. The notion of an atom of copper is, he points out, circumscribed. You can make a mental picture of it, and that is that. To copper as a substance, however, there are no bounds. You can go thinking about it till your interest flags. Similarly for shapes. A block is limited in three dimensions by its height, depth, and width; each of the same order of magnitude. A ribbon, on the other hand, has a thickness small compared with its width, but its length is unbounded. A movie film can be a single frame four sprocket holes long, or it may be a thousand feet long. It is still a movie film. This kind of thinking, which he sharpened considerably as he went along, runs through all his work.

At the very beginning you have to make what is perhaps a rather arbitrary, and certainly not entirely satisfactory, distinction. This is between mundane matters and special matters. Mundane matters concern entities about which there is general agreement that they correspond somehow to things that are unaffected by what people think about them, by the age, sex, and marital status of the thinker, or even by whether there are people around or not. Such general agreement may, of course, be incorrect; the point here is that there is general agreement. Special matters are those about which there is not such general agreement. Mr Micawber, for instance, is certainly not unrelated to reality, as one knows to one's cost. Nevertheless, he is a fictional character, and generally accepted as such. Certain philosophical and religious systems are firmly, and possibly correctly believed in but there are also unbelievers. So these Jolley classifies as special matters. Clearly this distinction depends greatly upon where, when, and to whom you are talking. Atoms, for instance, will not be given the same status by all groups of our own society, let alone at different times throughout history.

After the division into objects and substances at the bottom of any level, there comes the question of organization of these objects and substances. He distinguishes between mere conglomerates, through mixtures and solutions, up to series such as the linkages of a mechanism. Similarly for substances. On top we have the interaction of series to form something that has existence in its own right, organized for survival as an individual (homeostasis). For example, a committee considered as a group of certain individuals disintegrates if those individuals go away. A committee, considered as an organization, lives for ever provided its members are replaced. Also, the same individuals can form different committees, provided that they elect different chairmen. Such entities form the elements of the level above. But this is not enough; we have to consider semantic types as well as organizations.

He uses eight semantic types, which correspond fairly closely to adjective and adverb in grammar. They range from passive attributive relations (states), through passive entitive terms (things) and active attributive relations (actions) up to active entitive terms (phenomena). The notions of actions are not bounded in time and space, those of pehnomena are. His semantic types thus range from, say, greenness to productivity of a factory, in eight stages. I will not go further into his arrangement of ideas; most of you know his books, and they are available. Open to argument in places they certainly are. They are also useful.

What kind of self-similarity does he use to bind all this together? He did not hit on the answer till fairly late in his investigation. He then realized that he was basing everything on relational structures; part-to-whole or, better, described-in-terms-of relations. This is used in many other classifications but not, I believe, as an overriding principle. He therefore studied the classification of such relations themselves.

Structurally the most simple relation is Reflexiveness, which applies to one subset only. A relation is reflexive if it applies to itself. Thus 'absence' is not reflexive, because nothing can be absent from itself. 'Identity' is reflexive, because anything is identical with itself, or so one would suppose. The next higher relation is Symmetry, which involves two subsets. If the relation between *A* and *B* is symmetric, then it holds between *B* and *A* also. Thus 'brother of' is not a symmetrical relation, for if *A* is the brother of *B*, *B* may not be the brother of *A*. She may be his sister. On the other hand 'sibling of' and 'equal to' are symmetric relations. Then comes Transitivity, which involves three subsets. if *A* has a certain relation to *B*, and *B* has the same relation to *C*, this relation is transitive if it holds between *A* and *C* also. If I am the father of somebody, and that somebody is also the father of somebody, I am not the father but the grandfather of the last somebody. So 'father of' is not transitive. On the other hand 'not less than' is a transitive relation.

He then introduces a relation, not between subsets of a full set, but between two full sets. Of this kind is the relation between the set of individuals who make up a set of committees and the set of committees they make up. Another example familiar to us here is that between the set of items and the set of their features. On a feature card the set of items is the set of columns, and the set of features is the set of rows, or vice versa. This, I suspect, is the origin of the name he gives it. Transversiveness. In his scheme this relation is a device, if I may say so, for pulling oneself up by one's bootstraps to a higher level. Some such device is needed because of the essential difference between a set and the member of a set. One man may be a member of a crowd, but he is not himself a crowd; nor is a crowd a man. When a set has just one member this distinction can be forgotten, with disastrous results. So some device is needed to make the transition without disaster. Whether Transversiveness does this I am not yet sure. In the meantime I have an uneasy suspicion that it is being used in a something for nothing capacity. Certainly it and other means, preferably honest ones, for achieving the same ends, deserve full discussion.

Jolley's scheme, based on the abstract structure of relations, does sort out a very large range of topics into various levels in a rational way, but there are problems. For instance, does the method lead to the same results when applied by different people? He did some work on this, and found that it did. This should be followed up. Again, the scheme deals with notions, not with the linguistic expression of notions or so it seems. In fact the scheme is a lot more linguistic than it looks at first sight. He is working on the level of a thesaurus, and much of his research was done with dictionaries. To my mind there is a larger grammatical, and therefore arbitrary, component than is immediately obvious. The lowest levels are elementary mathematical notions. For some people, and I am one of them, mathematics is man made, not something that goes on existing after all mathematicians are killed off and no one is thinking about it anymore. What mathematicians take as being elementary notions are arbitrary. Presumably, as with words in a dictionary, some notions must be undefined. Which ones are a matter of taste. As it stands it is quite useful, but how useful? Also there are some logical and philosophical problems involved.

From an immediately practical point of view one can say that, if one had to classify mathematical literature without any reference to how it developed, this would be an admirable way of doing it. The appalling complexity of actual mathematical classifications comes from the fact that people relate what has just been written to what has been written before till this becomes unworkable. Then one shuffles and stitches up again, accidents of history and previous regroupings and reinterpretations lingering on. Nevertheless, in many contexts this may be preferred, for all its inconsistencies and ambiguities. On the whole it does correspond with how mathematics is taught, and therefore with how libraries are consulted. Perhaps Jolley's scheme could provide a thesaurus for use with the usual mixed historical-conceptual mathematical classifications?

To sum up, what Jolley attempts to do is to arrange notions in unambiguous partial order. What he has provided is, at least, a very interesting scheme for arranging the interactions between words and notions. He is working in the field of the thesaurus. To my mind, quite as interesting are the tools he uses for this task. Perhaps they will prove more important than the scheme. As with all things worth doing, his work has utilitarian, aesthetic, and philosophic aspects. All these need discussion and development. Tripods cannot stand on less than three legs.

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The theory of integrative levels and its relevance to the design of information systems

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THE CLASSIFICATION RESEARCH GROUP was founded early in the 1950s and Leo Jolley joined a few years later. He was not able to attend every meeting, but when he did, he usually came armed with a very substantial contribution, and between meetings he regularly wrote in to comment on the minutes which he had received. He was a valued friend, and from conversations with him I know that he found the CRG meetings stimulating, and I believe that it was particularly in this area of the theory of integrative levels that he derived a good deal of value himself from our meetings.

The theory was first discussed in the CRG late in the 1950s, chiefly through a reading of Joseph Needham's Herbert Spencer lecture at Oxford University, 1937, 'Integrative Levels; a revaluation of the idea of progress'. The germs of the idea were discussed both inside and outside the meetings, and can be found in the first edition of Brian Vickery's *Classification and Indexing in Science*,[1] where there is a section on p. 127 called 'Levels of Aggregation'. A discussion paper, 'Classification and Integrative Levels' was circulated around the same time and, after extensive discussion and revision, was finally published in the *Sayers Memorial Volume*, published by the Library Association in 1961. I think the early history of the CRG is fairly well known by now, through various articles and the CRG Bulletin published from time to time in the *Journal of Documentation*, but perhaps I may briefly run over the specific points which led up to our interest in this theory.

Our members came from a wide variety of library and information services, with an equally wide variety of backgrounds, but all were agreed on at least one main idea: that existing classification schemes had proved unsatisfactory for the purposes of specific and detailed information-retrieval systems, and we were therefore looking for some way in which this situation could be improved. Starting from the rejection of all existing schemes, therefore, we found during the first decade or so that our own needs made it necessary for us to compile a number of schemes to suit special interests. Several examples of these are also given in Vickery's book. All of these schemes, of course, owed a great deal to previous workers on the theory of classification, in particular to S. R. Ranganathan, and his theory of facet analysis. The CRG did not fully accept

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Ranganathan's ideas that all facets are derived from specific applications of one of his five 'fundamental categories' (*P* for personality, *M* for matter, *E* for energy, *S* for space, *T* for time), but we became convinced of the technique of analysing a given subject into a set of categories of terms; each set of terms was homogeneous in the sense that it was clearly logically different from the other sets, and for its own distinct relationship to the main subject itself. Every one of the specialist classifications came up against one major difficulty: it arises from the simple fact that no part of nature can be isolated, as in a special classification system, and no matter how precisely defined the special subject might be, there inevitably arose the considerable problem of 'marginal fields'. To give but one or two simple illustrations: in making a classification for container manufacture, one inevitably has to have a category of 'packs', the things that go into containers, because these form an important element in the literature. But since almost anything can be packed—from aspirins to battleships—one finds oneself up against the problem of whether or not to enumerate every possible item of packaging. Similarly, in the field of education, since any subject may be taught, one finds oneself up against the problem of a 'curriculum' facet, in which, if one were not careful, one would find oneself enumerating the entire universe of knowledge. The fact is, of course, that each specialist regards, at least for the time being, the whole of the universe as centred upon his speciality.

We therefore came inevitably to the conclusion that no special classification scheme could be complete, but would have to rely on the existence of a general scheme, outside of itself, which covered the whole of knowledge. Most of us tended to use the UDC, or be satisfied with a partial—a *very* partial—enumeration of marginal fields. A few of the more ambitious, however, turned our attention to the problem of constructing a new general classification scheme. We felt (and I think we were justified) that we had solved all the problems of making a specialist scheme, except this one of how to deal with marginal fields and since we did not think we could cope with marginal fields as a series of other special schemes, it seemed obvious that to start on the universe of knowledge itself would be the most sensible course.

But how would this start be made? All the existing general schemes seemed to have begun by a more or less arbitrary decision on what is, after all, the basic question: how does one define a 'main class?' This is where the theory of integrative levels came in very strongly. Despite his abandonment of a scientific search for a solution to this problem, Ranganathan himself had not escaped it. In his works it appears as a sort of confusion between 'personality' and 'matter' terms; in one of his articles, he says

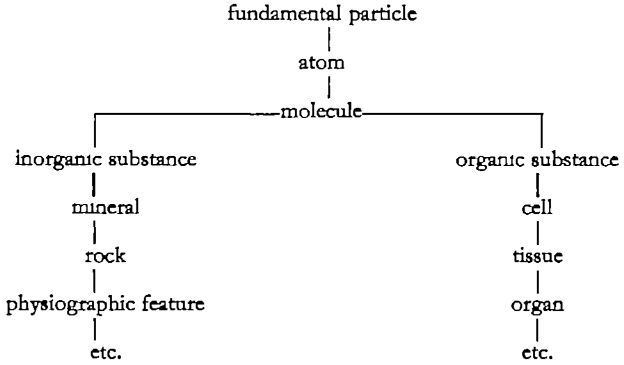
> 'this distinction depends on the context of the host class. For example, in the context of carpentry, 'chair' is personality. It is only the 'timber' or the 'steel' or the 'aluminium' of which it is made, that is matter. But in the context of metallurgy or chemistry, 'steel' and 'aluminium' have to be taken as personality. There are cases which are not even as easy as this. At present, personal demonstration is necessary to develop the necessary insight and reflex action into this delicate decision. Much work remains to be done to put the solution of this problem on an objective basis. Some criteria should be evolved to identify and isolate as a personality isolate or any other isolate in a given subject-context'.

Yet he himself was apparently unwilling to undertake this search for the necessary criteria, and the CRG came to the conclusion that the theory of integrative levels might well provide the necessary systematic or objective basis.

To put it rather simply, the theory of integrative levels is that the world of entities evolves from the simple towards the complex by an accumulation of properties or influences from the environment. Each entity preserves its integrity by means of the relationship between its parts, but as the relationships between the entity and the environment become more complex, the entity grows itself and in due course an aggregation of entities or properties become a new whole of a more complex nature. That is, the original entity, by setting up relationships with other entities, which at first may be slight and temporary, gradually establishes firmer connections and eventually binds the other entities to itself inextricably, thus forming a new entity with its own unique properties and relationships between its parts. Of these parts, the original entity will form one. Thus, each whole entity is greater than the mere sum of its parts; the reason is that the relationships between the parts are as important as the parts themselves, and if these relationships are broken, the entity ceases to possess its integrity or its identity, and becomes no more than a heap of bits and pieces. If we take a simple example: a bicycle is more than a mere heap of pieces of steel or aluminium or plastic or rubber, or whatever. It has a series of parts which are made out of these materials, but it is only when the parts are put together in a certain set of relationships that a new entity emerges which, unlike the heap of parts, is able to transform the rotary motion which I apply to the pedals into a horizontal motion which carries me and the bicycle along the road. An individual person, as Bronoswki pointed out in his book *The Identity of Man*,[2] is a unique entity, even though all of us have more or less the same collection of chemical and biological materials in our make up. This uniqueness derives from the fact that each of us interacts with our own environment throughout our own life history, and since this history is unique, we ourselves are unique entities.

How, then, did this relate to our problem of a general classification scheme? Well, for anyone who was well-read in the works of Ranganathan, it seemed rather obvious. He had never succeeded in explaining satisfactorily his concept of 'personality', he had merely said that given these main classes, the principal focus of interest would be this particular facet. Applying the theory of integrative levels, however, clearly led to a definition of a series of what could easily be called 'personality facets'. If we start from the real world we see that there is a series of levels of 'things': fundamental particles—atoms—molecules, and so forth. This is obviously not a straight linear series; it has several branches, such as the division between organic and inorganic.

Another division occurs above the level of Man: along one branch we find more complex forms of organization made up of individual human beings such as families, communities, nations, etc.; along the other we find the intellectual products of individual persons, such as language, literature, art, religion, and so on.



In 1963 the CRG held a conference in London to discuss the way in which a grant from the Science Foundation of NATO could be used to design a new general scheme. There, E. J. Coates summed up our experience to date in his paper, 'CRG proposals for a new general classification'.[3] He pointed to the arbitrary nature of previous attempts at main class identification and went on:

> 'The CRG thinks it essential that this particular arbitrary factor shall not appear in the new scheme, and it is proposed to derive the initial breakdown from the theory of integrative levels . . . The notion of a series of organized wholes of increasing complexity offers an immediate hint of a comprehensive formula for the location and citation of composite subjects consisting of elements drawn from different levels'.

The order he gave was:

0
01
02
1 Fundamental particles
2 Nuclei
3 Atoms
4 Molecules
5 Molecular assemblages (natural objects and artefacts)
6 Cells
7 Organisms
8 Human beings
9 Human societies

In his book called *Data study*[4] Leo Jolley began his discussion in a similar way, from what he called 'generic points':

> 'in examining the semantic continuum, we noted the existence of a point, rather like unity in the continuum of rational numbers, below which we encountered sub-codes, and above which we met with increasingly specific terms. This we called the generic point. To conclude our examination of the continuum, we may see whether we can come a little nearer to finding which sorts of term can be taken as generic.'

He extended the application of the theory to mathematics, and also identified a whole series of sub-levels:

0 Set-theoretic
1 Geometric
2 Subatomic

3 Molecular
4 Cytomechanic
5 Biomorphic
6 Communal
7 National

To his series of levels of 'things' Jolley also added 'those ideas we call qualities', and 'the types of terms we may call occurrences'. Among the latter he included wind, fire, dance, earthquakes, meiosis, declarations of intent, performances of Il Trovatore. The whole set could be combined variously to produce eight semantic types:

> Passive entitive terms (things) and passive entitive relations
> passive attributive terms (qualities) and passive attributive relations
> active entitive terms (occurrences) and active entitive relations
> active attributive terms (changes) and active attributive relations.

A further dimension was beginning to be explored by Barbara Kyle in the area of what she called 'mentefacts', that is products, like artefacts, but arising out of the work of the human mind rather than the work of the human hands. Again, it is not difficult to see how the theory can be applied. If we take the letters of the alphabet, they form entities which can unite with other entities to form new order entities called words, and the relationship between the various letters will determine the form of the new entity, the word. The letters E,A,R,T,H, can be combined by joining them together in that particular sequence, when they form the word EARTH; if they are arranged in a different sequence, that is if the relationships between the individual letters are changed, the same set of letters will form a different new entity, the word HEART. These two words do not have the same meaning, since anagrams are not synonyms. Similarly, words can combine to form sentences, sentences to form paragraphs, paragraphs to form essays for papers read to conferences. We had not got very far with the study of mentefacts before Barbara Kyle's untimely death, but another paper dealing with this was given by Phyllis Richmond at the 1964 Second International Study Conference on 'Classification Research' held at Elsinore in Denmark.[5] In this Dr Richmond claimed that while the CRG's use of the theory had so far been confined to organizing *physical* things,

> 'it is possible to utilize the theory of integrative levels to build a table showing a completely different set of levels, considered solely as mental aggregates, but it does not make it clear what criteria are necessary for the argument or the philosophic approach needed to fit them into one big set of levels.'

To make the picture more realistic, two sets of examples are used in illustration:

1. Elementary particles
2. Atoms
3. Molecules
4. Cells
5. Organs
6. Disseminated products of organs.

Levels	*A*	*B*
1. An observation	Piece of pasteboard	Human being turns red in face
2. A group of observations	Book card, 3"×5", signed, dated	Human being red-faced, eyes flashing, makes noise, gesticulates, etc.
3. 1st level generalization	Charge card	Human being is angry
4. 2nd level generalization	Charge card indicates book is unavailable	Human being is frustrated
5. A law	A book should be on its shelf or charged out	Anger stems from frustration

Dr Richmond drew attention to certain defects in the theory of integrative levels as it then stood, and this was also underlined by Eric Coates in his opening remarks to the discussion which followed the presentation by Dr Richmond of her paper. I think it would be true to say that even today we still have not come much nearer to resolving some of these difficulties. There are probably many causes for this, but the fact is that the CRG in recent years has been preoccupied with two other major efforts; one is the production of the new edition of the *Bibliographic Classification* of H. E. Bliss, which is being produced by Jack Mills and his colleagues at the Polytechnic of North London, and published by Butterworths. The first fascicules of this have just been published.

The work which was begun as a result of the grant from NATO was directed, when Derek Austin took up the research from Helen Tomlinson, towards the production of the new system of indexing used by the BNB and known as PRECIS. These two outcomes are undoubtedly of sufficient importance to warrant a certain amount of satisfaction, but actually neither of them has completely solved the problem of applying the theory of integrative levels to classification for information retrieval.

What does seem clear to me is that the theory as we originally considered it, would not in fact be adequate by itself; and yet, all the work which was done seems very much parallel to another stream of current thought, namely the development of General System Theory by various philosophers of science such as L. von Bertalanffy, Ervin Laszlo, Kenneth Boulding, and others. There is a flourishing movement mainly in the United States, and a *General Systems Yearbook*.[6] I have personally found this theory very helpful, not only in its application to classification, the analysis of the structure of knowledge, but also in looking at library and information services from a management point of view. I see the same sort of features in Systems Theory as in integrative levels theory, but with more elaboration, naturally, with respect to the rules and laws which govern the interaction between the various elements of an entity. I find it very heartening that the study of classification for information retrieval, which we in the CRG have been carrying out now for more than a quarter of a century, should also have at last come to conscious philosophical relationship with other aspects of our work. I think I would claim that, for myself, my interest in classification has always been based on problems I have encountered in reference and information work, that is the meeting of the real needs of users. It pleases my somewhat orderly mind that a theory which began as a rather specialized explanation for one particular problem should have broadened out into a much more generalized system of explanation which has applications in so many of our activities. For example, this very meeting is a system which demonstrates this unity. For, in addition to being a discussion of a particular technical feature of our work, it is also itself a gathering of individuals of a particular kind. We are not merely an accidental group of separate individuals; we are assembled in a formal way, in which an audience is listening, with respect and attention, to a speaker whose specific relationship with this audience consists in the fact that we are here in commemoration of a colleague who contributed to so much of our work.

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The potentialities of the holotheme

A. F. Parker-Rhodes

Paper presented at the Leo Jolley Memorial Seminar, 20th June 1977

THE INTENTION of this paper is to present an assessment, strictly from my own standpoint, of the material given in Leo Jolley's book *The Fabric of Knowledge*. It will be concerned mainly with two aspects: first, certain points about the mathematical structure of the classification of knowledge which he called the 'holotheme', which in my opinion calls for comment and secondly, sundry criticisms of the system of 'integrative levels' which form the backbone of the whole scheme. To summarize my conclusions in one sentence, Jolley's work contains a challenge—or alternatively a temptation—to extend and improve it; but the attraction lies more in the structure than in the content, and past experience warns us that this may be illusory.

The field which the holotheme is intended to cover is a very wide one. In principle, the whole of human knowledge and speculation, but in practice only what Jolley called the 'mundane perception class', that is to say, excluding the works of man's creative imagination, relegated to an unexplored 'special perception class'. From the linguists' point of view, the classification codes assigned to the various mundane concepts could provide an exhaustive set of *partial* dictionary entries for all words pertaining to that class—including, in principle, all systematic uses even of syntactic markers.

An important question which must be settled at an early stage is *what* it is that the holotheme is actually classifying. Not the actual things, classes, relations, and so on whose names appear in the book: to describe and account for these is the task of the various sciences, not of a classification scheme as such. One could say that the entities classified are 'concepts', the term used above; I think it better, however, to think of them as *words* (more strictly, word-uses). If this is accepted, it follows that the most productive viewpoint for considering the system is the linguistic one. Human beings do not have any direct access to reality, and have no warrant for classifying things-in-themselves in any way; but we do have the ability to talk about what we have been able to find out, and we are competent to classify the words we use to do so. Such a classification is manifestly of some relevance to 'reality'—indeed, it is perhaps as near to reality as we can hope to get within the constraints of an objectively verifiable consensus. But it is an error to suppose that it is more than this, or to hope for more from it than some kind of dictionary.

The 'kind of dictionary' which suggests itself in this connection is that in which one looks up meanings and finds words to express them: that is, a thesaurus. Applying the procedure described in Leo's book, one could first

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derive the appropriate code (or codes, for there is no certainty of finding only one) which, being numerical, would take us at once to an appropriate entry, where the available vocabulary would be found, classified (as. *e.g.*, in Roget's *Thesaurus*) by grammatical class and register. Naturally, as in any thesaurus, the systematic part of the process would get us only part of the way: *e.g.* all species of animals will have the same code, so that provision must be made for mere listing of the names of different animals, of which there are (in the scientific register) over two million. Most such lists will be much shorter, of course, but it is as well to remember that when we talk of the 'whole of knowledge' there is a great deal of material which is not distinguished by the holotheme, or by any other classification scheme of general application; what such schemes do, or could do, is to provide a framework within which special disciplines can spread themselves as the need arises. It is, therefore, as the table of contents of a thesaurus that I see the principle application of the holotheme, and my comments will be oriented in this direction.

The most striking feature of Leo's system is the amount of mathematical structure it contains. The codes it provides are essentially strings of binary digits and the totality of these defines, of course, a Boolean lattice. But there is also a partial structuring among the digits themselves, that is among the minimals of the lattice, which is, so to speak, additional non-syntactic information added to the system itself, which, if valid, must be taken as some kind of statement about the concepts being classified. It is not unreasonable to expect that such statements could be made: for if it is word-uses we are classifying, the limitations of the human brain must be supposed to have some reflection in the way we apportion words to concepts. This is not, true, a fact about the world itself, but it is still a fact, and one potentially useful to know.

To give some examples of the nature of this extra symmetry in the holotheme. One of the bits in the category called 'formative grade' denotes the distinction between objects and substances; the corresponding bit in the 'integrative level' category separates units from assemblies. Both contrasts can be described as 'located' versus 'extended' or, in linguistic terms, 'countable' versus 'non-countable'; the last formulation even extends to the corresponding bit in the semantic type category which contrasts 'terms' (countable) with 'relations' (not countable). Another example of how the system exhibits a more-than-Boolean structure arises from Leo's characterization of the three bits assigned to the formative grades among mathematical notions. These answer questions, the formulation of which calls for respectively one, two, and three different terms: to define reflexivity, we need only one, '$aa = a$'; for commutativity or symmetry we need two, '$ab = ba$', and for transitivity we need three, '$ab \ \& \ bc \supset ac$'. Moreover, these three properties of relations can be extended to non-mathematical parts of the holotheme. This introduces a linear order—1, 2, 3—into at least three of the minimals of the otherwise featureless Boolean lattice.

It is evident that, as the work progressed, Jolley became fascinated by such symmetries, appearing as they did (or so he tells us) among data collected originally in a fully empirical spirit. Some may suspect that he was rather carried away by them, coming to think of them as features of his system which might be expected to have a general validity. I suggest that, as I hinted above, this would not be an absurd expectation in a classification of words, though it would certainly be unjustified to infer from it a corresponding set of relations among the things named by these words. It is, in fact, quite plausible (whether or not it is actually the case) as a feature of an effective thesaurus.

My impression of the system is, therefore, that the fact that it has been found to 'work', at least for the fairly wide-ranging collection of material to which Jolley himself applied it, together with its highly structured character, suggests that it deserves serious attention from those concerned. Certainly co-ordinate indexers are among these, along with thesaurists, artificial intelligentsia, and others. In the natural course of events, this work would devolve in the first instance on the author of the system; but this is, unhappily, no longer possible. I would therefore put in a plea at this point that others should be encouraged to embark on a more exhaustive testing of the holothemic schema than has yet been carried out—notwithstanding the relatively high chance of a null outcome. It would surely be a suitable project for Ph.D students to undertake: at the very least, the paperwork resulting from it would be impressive!

I turn now to some points of criticism. Despite the relatively radical character of some of these, I do not think that they would destroy the symmetries of the scheme which are, I suppose, its main attraction; in fact, if consistently implemented (itself a very considerable task!) they would rather tend to enhance this feature.

The first point which strikes me on reading *The Fabric of Knowledge* is that Leo was muddled on the subject of 'integrative levels'. These form the backbone of the system and, in true Boolean fashion, there are eight of them, each divided into two 'ranks'. But the characters of these levels and ranks are not uniform along the series. The second level, including 'point' and 'space', is followed by one whose ranks are called 'photon' and 'particle'; that is, mathematical concepts are associated with supposedly objective things. This is a different kind of relation from what we find at any other step in the series. Photons (may we read rather 'quantum-numbers?') and particles are followed by 'atoms' and 'molecules', but after that we come to 'organelles' and 'cells'. Here then is another major break, for the relation of living matter to inorganic matter is not just a question of integrative level, but something much more fundamental.

In seeking a name for this relation, I am hampered by the fact that the terms already deployed have almost scraped the barrel; I therefore apologize for the term 'epiphenomenal plane', which I shall use here. An example which helps to illustrate what is meant is that of a water-wave. We think and speak of a wave as a thing, concrete and countable, not abstract; it has a certain shape, and a certain pattern of movement, and even though its life is limited there, are 'things' more transient as well as less. But we get into trouble when we ask what a wave is made of. Water? No—for it is easy to show that the molecules of water go round a more or less closed path as the wave passes by, and no net transport of water is involved. Wind then? Again no. Energy? Well, yes, in a sense, but what is not? The truth is that a wave is a form, imposed on a water surface by external forces, which, while it lasts, possesses sufficient self-identity to warrant a name and furnish us with a concept. It is a concept which I have been unable to place in the holotheme which Jolley has described.

The important examples of the second epiphenomenal plane are, however, living organisms. These are forms, and though they seem to be 'made of' matter, in a sense that a wave is not 'made of' water, or a flame of inflammable gas, a little thought will show that the matter contained in their bodies is continually being replaced, and that this replacement is essential for the continuance of active life. Like waves, organisms are forms manifesting through matter, using it, rather than made of it; but, unlike waves, these forms contain specifications of themselves so that they can reproduce and so outlast their own transiency. Life is, thus, precisely an 'epiphenomenon' on chemical matter.

There is thus reason to redivide Leo's eight 'integrative levels' into sets of pairs, just as each one is itself shown as a pair of 'ranks': levels 0,1 can be labelled mathematical; 2,3 are concerned with matter; 4,5 with life; and 6,7 are to do with human institutions. The break between 3 and 4 marks the distinction between two 'epiphenomenal planes'. On the other hand, that between 1 and 2 is of a quite different type, where we pass from a mathematical description to a supposed physical embodiment of it. This ought to be repeated, if the binary structure is to be taken seriously, at the level of 5 and 6: but obviously it is not. In fact, we enter here yet another 'plane', for human society bears to the populations which exemplify it a closely analogous relationship to that between the form of a living organism and the matter through which it is expressed. A social community outlives in general its members, and possesses a self-identity independent of the particular individuals which compose it; it is itself a form, whose transient substance is provided by the members of a particular biological species. Our planes then include: physical, organic, human.

On this account, I consider the series of levels as given a lopsided affair. The 'mathematical' or descriptive quality of 0,1 ought to have analogues at each of the *three* epiphenomenal planes; and, if the binary principle is a true insight (which most of us would probably question), there must be at least one, and perhaps even five, additional planes. This (or these) might be identified with Leo's 'special perception class', were it not for the temptation to insert an additional plane *below* the physical, such as many theorists are feeling for. The likelihood is that the special perception class itself contains many planes, including, as it is apparently intended to, everything from Sherlock Holmes to God. I have not, naturally, attempted the kind of reconstruction of the holotheme which these ideas suggest; it evidently calls for some radical rethinking but, as it seems to me, it is likely to survive in its essential structure, even if the numerical codes assigned to particular concepts do not. Indeed, one can begin already to see an increase in the ultra-Boolean structure of the system, as the mathematical terms 'member' and 'set' are supplemented by terms similarly descriptive of the chemical level 2, presumably 'arc' and 'graph', and these again by a further set corresponding to the organic plane. Since this is concerned basically with information, one looks for language-based terms, such as 'word', 'word-string', 'sentence', and 'text', corresponding respectively to, say, 'gene', 'genome', 'procaryote', and 'eucaryote'—I cannot see the biologists being happy with Leo's organelles and organs as integrative levels!

While one may, and inevitably many will, suggest 'improvements' to the scheme proposed in *The Fabric of Knowledge*, it does not follow that these improvements will in fact improve the performance of the system for the purpose for which it was designed. Even if there is, underlying the holotheme as Jolley describes it, a more elaborate, symmetrical, and perhaps more intellectually satisfying system to be discovered, it is likely enough that it will serve the librarian, the thesaurist, and other users less well than the seemingly crude summary of it which Leo has left us. This is the practical question, and it is one which can only be settled by experiment. In view of the successes so far claimed for the holothemic scheme, which I do not here wish to question, it is greatly to be desired that some kind of experimental test of it should be devised and (if possible) carried out. But what could this be? Is there, in fact, any technique which would serve to test it?

I can think only of a rather impracticable one, namely to constrcut a thesaurus, based on assigning holothemic codes to a large collection of word-uses, and then to see whether a large sample of concepts could be identified, by means of this thesaurus, by a sample of relatively untrained users. If the experimental sample were too well trained, they obviously could do it; they would learn in this way that 06317 meant 'merger', in the same way that an Esperantist learns to call it 'unuigo', and so forth. But, if they were not trained at all, they could not even begin. So even after the very great labour of constructing the thesaurus had been done, methodological difficulties would remain. I hope that a better way could be found to assess the system, and to compare it with alleged 'improvements' or other alternative classifications. But I certainly think that it is worth a try, for if it does work, that is to say work better than the very inadequate systems at present available. it will at least be useful. And it may contain valuable intellectual insights after all.

When all said and done, can there really be any 'intellectual insights' in such a scehme at all? The more the structure, the more the symmetries of the system on which such 'insights' rest, the more artificial the whole exercise seems. There have in the past been many attempts to classify human knowledge by neat and simple schemata, but none have had sufficient success to become well known or even to have acquired a following. We have concluded, on the whole, that the reason for this is simply that the project is misdirected; the totality of knowledge simply lacks the kind and quality of structure which success in this task would presuppose. In short, it has seemed a wild goose chase, no longer worth pursuing. I imagine that most of us who open *The Fabric of Knowledge* do so with a pre-programmed prejudice against it—'here comes one more perpetual motion machine'. Have we any reason, after looking into it, to change our minds?

Much depends on the autobiographical hints which Jolley has given us. He claims that the system arose in his mind quite gradually, as a result of successive improvements to a system developed in the first instance for handling the ever-increasing volume of material which came to hand in the course of his professional work. Only at a relatively late stage (we are given to understand) did the extent of the symmetry and elegance of the system become apparent, and success began to attend its deliberate extension. If this is so, then though the *product* as ultimately written up seems to be strongly biased towards the *a priori*, the *substance* of the system arose, at least at first, empirically. This is the classical pattern of scientific discovery, and if it is correct it goes some way to allay anxieties based on the possibly inapposite analogies of earlier work on the same lines. My conclusion is, therefore, that the system is worth taking seriously enough to be further tested. I have already indicated what I think might be improvements to it, but they will be pointless if there is nothing to be improved, just as much as if they prove to offer no improvement from the practical point of view. So, testing clearly ought to start from what there is in the book; improvements, if any, can wait.

I have already indicated that such testing is likely to be difficult, laborious, and open to criticism from various angles. But these should be taken as challenges, not as deterrents. But there is one aspect of the holotheme which might well be fairly easily examined, and this would give some guide as to what might follow. Inevitably, the holotheme is a Boolean lattice. Hitherto, all such lattices that have been used to classify concepts have had the property that the great majority of their elements were empty: that is, while every word-use may be codable, a code made up at random is most unlikely to denote anything that anyone has ever thought of. From what is given in the book it seems likely that the holotheme may be less subject to this effect than some other such systems. Doubtless some parts will prove less productive than others, but if the blank codes are not too many, and are not too randomly grouped, then we shall have a system which is in this respect—and it is an important one, especially for the practical user—better than its rivals. I would suggest that this be the first test to be made; and if it is successful, it will be worth a lot of trouble to devise more penetrating methods for its further evaluation.

I shall not try to guess what the outcome of all this testing may be. I merely repeat, once again, that I hope it may soon be begun. It would obviously be useful if so fundamentally simple a system could be made to work; it might well lead to insights into areas of knowledge where light is much needed. And if it did, it would give our friend Leo a well-deserved place in the history of human thought.

Major integrative levels and the *fo-so* series

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The term 'integrative levels' was introduced by Joseph Needham in 1937. He recognized a series of eight levels. Others have since proposed various different and often longer series. Now, by the rigorus application of two *ad hoc* rules or criteria for the discrimination of 'major integrative levels', the number of such major levels (on present knowledge) is found to be nine. Short terms are available for designating the members of the different levels. Having performed the formal classification of objects, according to integrative level, several new quantitative generalizations become apparent. For instance, there is now clear evidence of a general long-term acceleration throughout most of the period of biological and social evolution.

Paper presented at the Leo Jolley Memorial Seminar, 20th June 1977

IT IS ONLY RECENTLY that I have become acquainted with Mr J. L. Jolley's book *The Fabric of Knowledge*.[1] His meticulous work on the arrangement of ideas is impressive. But it is only about one of the several dimensions he uses, that of integrative levels, that I wish to talk. For some thirty years I too—and independently—have been wrestling with the problem of how best to classify the range of more and less complex natural entities. And it should be useful, now, to compare the results.

While Mr Jolley as an undergraduate primarily studied mathematics, as I understand, my own education was primarily in the biological sciences, but with some chemistry, physics and geology. Later, in the army, I was concerned a good deal with radio. But I have also had, since school days, a strong personal interest in archaeology and history.

In the early pages of *The Fabric of Knowledge*, Jolley sets out a long 'chain' of twenty-three objects, Figure 1, starting off with a proton, and ending up with the United Nations. It is rather a fine series. Each succeeding object contains one or more specimens of the previous object, but often—we should note—with some other different and substantial components as well. For instance the atomic nucleus of the carbon atom contains neutrons as well as protons.

Later on the same page he mentions an important shorter list (Figure 2). This series has nine members. I have used his exact words, but have taken the liberty of turning the list upside down, so that the more complex entities, said to be of *higher* organizational levels, are also *higher* up the page. And this list of nine categories corresponds closely to the nine major integrative levels which I have come to recognize myself. Soon I must explain the differences, with reasons.

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a proton
an atomic nucleus
a carbon atom
a methyl group
a phospholipid molecule
a lipoprotein membrane
a mitochondrion
a muscle cell
a muscle fibre
a muscle
a heart
a cardiovascular system
a human being
a degreasing section
a painting department
a production line
a factory
a neighbourhood
a town
a county
a nation
an alliance
the United Nations

FIG. 1: *Long 'chain' of objects*

nations
organized human groups
entire plants or animals
organs of the body
cells
organelles
molecules
atoms
sub-atomic particles

FIG. 2: *An interesting nine-member series*

Many of Jolley's original ideas are summed up in his diagrams on p. 17 and 24 of *The Fabric of Knowledge*. The first shows Jolley's classification of ideas according to perception classes, integrative levels, ranks, grades and semantic types. The distinction between 'mundane' and 'special' perception classes is deft and fascinating. And I suppose one can allow for ideas sometimes moving across from one class to another, either way. For instance, about 1960 the idea of continental drift became accepted and hence 'mundane'. Avogadro's hypothesis, in chemistry, moved in the same direction about 1860. But earlier the phlogiston theory had moved in the opposite direction.

The second diagram, of which the skeleton only is reproduced in Figure 3, shows the series of eight pairs of integrative levels which Jolley came to recognize, where 'more or less dependent units' alternate with the more important ones. So there were 16 or 2^4 smaller categories. A scheme like this may be expedient for indexing. But I am afraid that my impression is that it is

NATION
local authority

COMMUNITY
department

BEING
organ

CELL
organelle

MOLECULE
atom

PARTICLE
photon

SPACE
point

SET
member

FIG. 3: *Jolley's sixteen levels of organization*

too neat to be true. Had the originator become bemused by the binary system? At any rate there are many binary or dichotomous schemas in biology—such as the dichotomous keys which are widely used when identifying specimens—which are *not* neat like that. For some strands often have more or fewer dichotomies than the average.

One particular point about the present series is that to rank atoms as of subsidiary importance, in relation both to fundamental particles on the one side and to molecules on the other, seems rather preposterous. After all, most of the evanescent organic molecules of the food one ate yesterday are now no more; while their constituent atoms have endured, and will continue to endure, for millions of years. Even the unstable carbon-14 atoms, used in archaeological dating, have a half-life of more than 5,000 years.

Another point is that while photons have mass, and the series then ascends to objects of progressively greater mass and complexity, the four lower or 'mathematical' categories are of things which have no mass at all. I agree with the view of the Classification Research Group—to which Jolley refers—that the mathematical section does not really belong here at all. On the positive side, however, I do welcome his term 'local authority'. I have independently reached a similar usage myself, as in the later chapters of *Mainstream Hierarchy*.[2]

Among the earlier contributors to such studies, Jolley mentions both J. K. Feibleman and Joseph Needham. It was Needham who actually introduced the term 'integrative level'. This was in his Herbert Spencer lecture at Oxford in 1937, while in 1943 the lecture was published in a collection of essays entitled *Time: the Refreshing River*.[3] Noticing this on the shelves of a library, I first read it about 1950. Needham commented that when surveying the whole range of phenomena, 'we cannot consider nature otherwise than as a series of levels of organization . . .,' or 'integrative levels'. For the purpose of brief statement, he found it convenient to recognize a series of eight levels (Figure 4). At the

social association
animal body
organ
living cell
colloidal aggregate
molecule
atom
ultimate particle

FIG. 4: *Original scale of eight integrative levels as proposed by Needham at Oxford in 1937*

time I particularly welcomed the term 'social association' in a series which also includes atom, molecule and cell, just as I later welcome the social terms in the series used by Jolley. Dr Needham, as you may know, is a scholar of unusually wide erudition and sympathies. After a deeply religious upbringing, he became reader in biochemistry at the University of Cambridge, England, and published a standard work on *Chemical Embryology*.[4] During the war he spent a long time in war-torn China, on behalf of the British Council. Since then he has been engaged on the very considerable joint work *Science and Civilisation in China*,[5] while for many years also serving as Master of Gonville and Caius College. Thus, in his own specialist work he has spanned the hierarchy of integrative levels more thoroughly than have most scholars.

But consider the partial series shown in Figure 5. Phrased in one way or another, it appears in many lists. Multicellular organisms—such as a horse, a person, a butterfly or an oak tree—each contain organs, such as a heart or a leaf, for instance. And the organs and other tissues contain and consist of cells. But in one important respect these two lower levels (those of organs and cells) differ markedly from each other. For while the cells of a large creature are joined together, and collaborate, *there are other comparable cells which exist independently, indeed as free-living organisms*. And under natural conditions you do *not* find free-living organs. An amoeba is a one-celled animal which slithers over solid surfaces in ponds (Figure 6). A *Chlamydomonas* is a unicellular green plant which swims, in freshwater, by the aid of its two flagella. Each has its own nucleus (containing chromosomes) which acts as the headquarters of the cell, just as each cell in a leaf for instance also usually has its own nucleus with chromosomes. Such a multichromosome cell may exist *either* as a free-living individual organism, *or* the cell may be bonded or fused (in a sense) with many others, whith which it collaborates, as part of a multicellular organism.

multicellular organism
organ
cell

FIG. 5: *Partial scale of integrative levels, for discussion*

Thus cells, multichromosome cells, play a dual role, so to speak: they may either be independent and free, or else collaborative and fused. And biological organs do not have this dual role. To my mind this makes the level of multi-

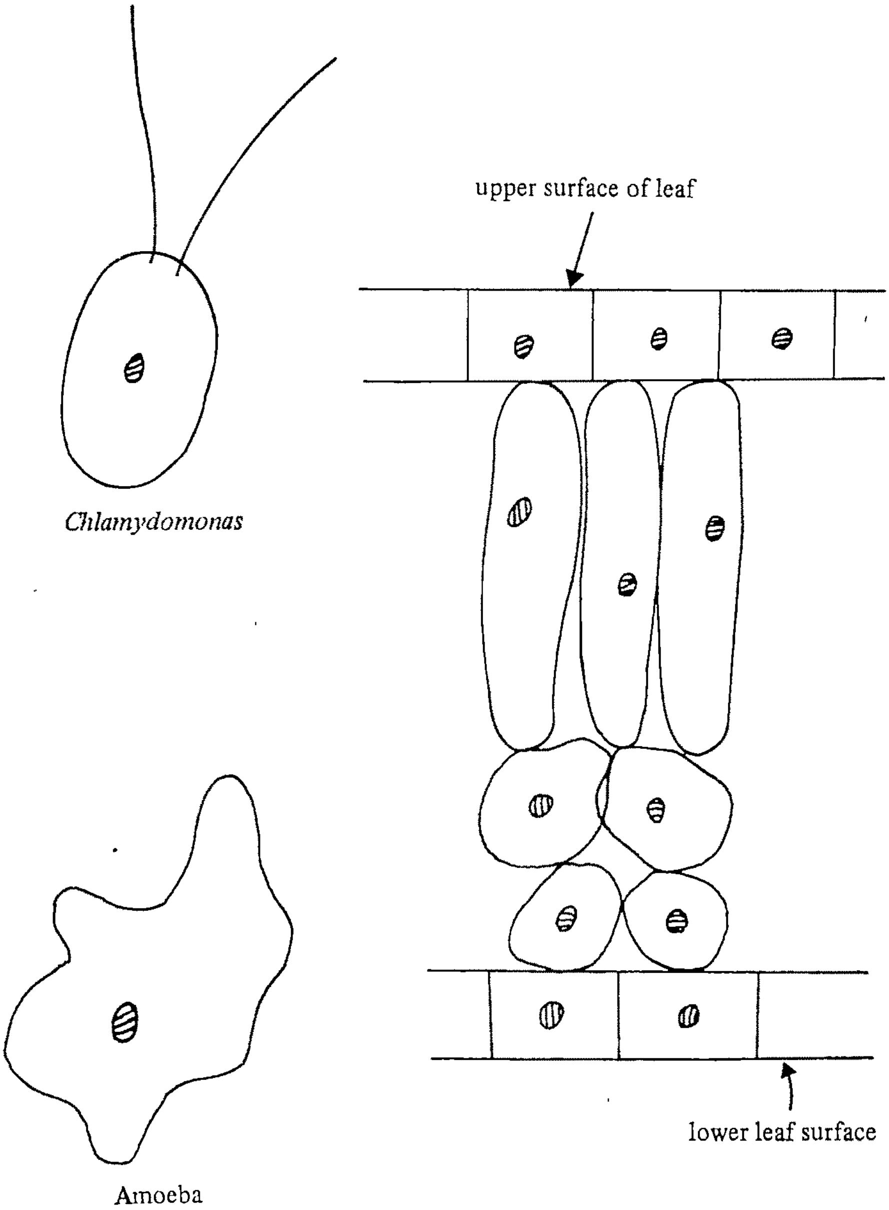

FIG. 6: *Some living cells, either freeliving or (on the right) collaborative (not to scale)*

chromosome cell more important than the level of organ: it indicates that it is a *major* integrative level.

The point is illustrated diagrammatically in Figure 7. The middle level is

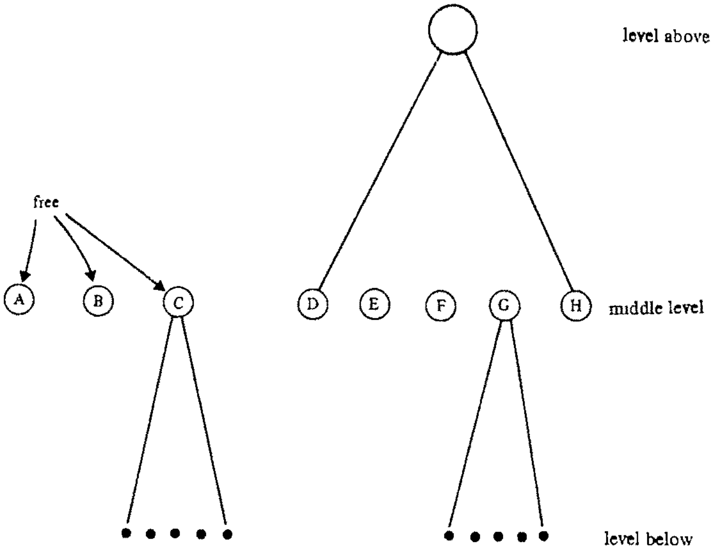

FIG. 7: *Diagram showing the two kinds of behaviour of entities at the 'middle level'. Some are independent while others are collaborative*

that of cells. Some cells are free, and others are fused together to make a multicellular organism. For instance A can stand for a free-living amoeba, and C for a *Chlamydomonas*; while D to H can stand for the large number of cells which make up a multicellular organism such as an oak tree. In this diagram only two cells, C and G, are shown as being themselves composed of smaller entities. But a more complete statement is given in Figure 8. Here all the

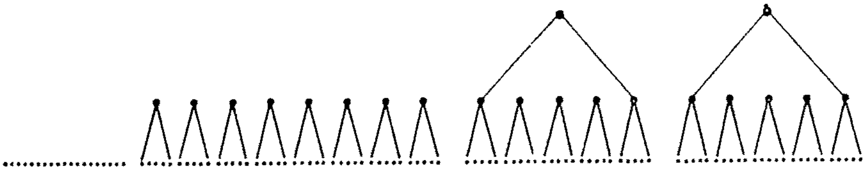

FIG. 8: *Diagram similar to Figure 7 but more complete*

middle-level entities (for instance cells) are shown as composed of lesser entities, while some but not others of the middle level are seen to act as parts which together constitute an upper-level entity. So far as I am concerned, this duality of behaviour, on the part of middle-level entities, is a character to be expected at all major integrative levels.

If one now thinks of the middle level, in this diagram, as the level of atoms, then the free ones, on the left, will include those of helium, neon and argon, etc.—inveterate loners—while many kinds of atoms are habitually fused with others into this or that kind of molecule. Clearly the level of atoms—on the duality criterion—is another major integrative level.

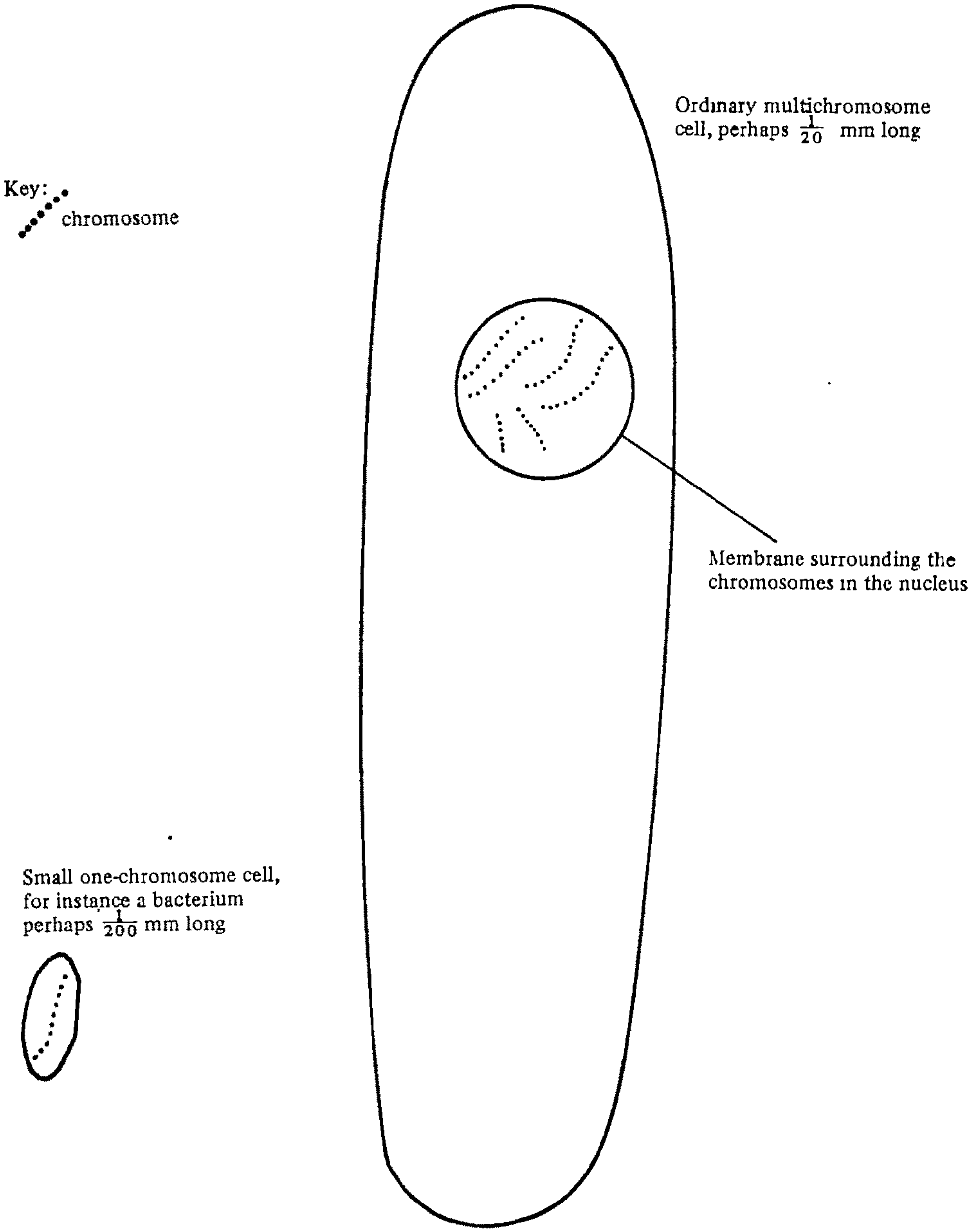
Ordinary multichromosome cell, perhaps $\frac{1}{20}$ mm long
Key: chromosome
Membrane surrounding the chromosomes in the nucleus
Small one-chromosome cell, for instance a bacterium perhaps $\frac{1}{200}$ mm long

FIG. 9: *Diagram contrasting a bacterium-type cell with an ordinary living cell, for instance a cell in a leaf*

Atoms are made up of fundamental particles. But some fundamental particles (on the left of the lower level) are free—such as the photons of a beam of light or the electrons which streak across the space in one's television tube, towards the screen, to make the picture. This duality of behaviour makes it clear that the level of fundamental particle is also a major integrative level. The same diagram can be used to illustrate duality of behaviour at other levels. Each of my major integrative levels typically conforms to this duality criterion. The one atypical exception is of course (by definition) the highest level—that of society of sovereign state—above which no fully fledged, higher still kind of entity has so far emerged.

Apart from the duality criterion, each of the major integrative levels also typically conforms to a compositional criterion, in that each entity at a major level is composed, materially, mainly of entities at the next level below. This is also illustrated, with regard to the 'middle level' of the same diagram. The atypical case here is of course that of the lowest-known level, where the entities do not all consist of still smaller entities.

We said just now that each entity is materially composed *mainly* of entities of the next level below. A word such as 'mainly' is necessary since in a multicellular organism, for instance, such as a horse or a person, there are many molecules of water and dissolved substances present ***in between*** the cells which mainly make up the organism. Indeed, the molecules of blood plasma account for about 4 per cent of a person's weight. Also the photons which traverse the eye may be thought of as remaining independent during that stage.

While an entity of a major level is mainly made up of entities of the next level below, there are often some loose entities of still lower level, such as the water molecules in a person's blood plasma and the photon's in one's eye. It is quite easy to express this structural relationship diagrammatically, as for instance on p. 52 of *Mainstream Hierarchy*. But in most hierarchial diagrams it is convenient to ignore these minor loose ends.

Having explained the duality criterion and the compositional criterion fairly carefully, it now seems best to change gear. I will just offer a rather brief review of some of the results which can be obtained by the operation of these local or house rules, so to speak. For further details please see *Mainstream Hierarchy*.

While, at first sight, the application of these two criteria or rules may seem straightforward, one still finds that several difficult decisions have to be taken as to just which entities should be regarded as belonging to the same integrative level. Here are two examples, about cells and about molecules, etc.

First about cells. Many of us were brought up to acknowledge a monolithic unity pertaining to the category of living cell. But since the war bacterial cells are found to have typically only one single chromosome (Figure 9), while ordinary cells often have dozens of chromosomes—each acting to some extent as a separate and independent headquarters. So I now regard an ordinary multichromosome cell (technically called a eukaryotic cell) as a closely fused group of many one-chromosome entities. The point has been reinforced because, since 1970, it is realized that chloroplasts and mitochondria have apparently descended from free-living bacteria, etc. and still have chromosomes of their own (Figure 10).

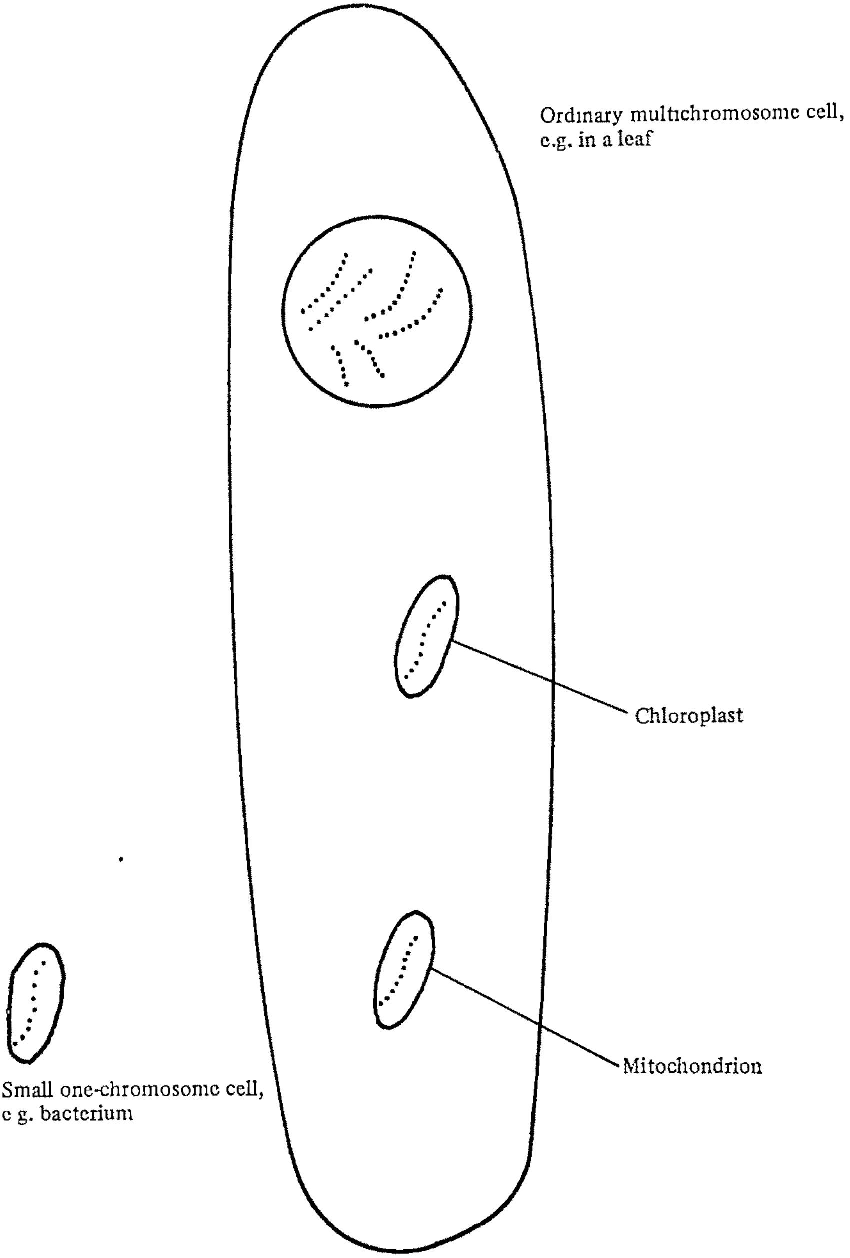

FIG. 10: *Revised post-1970 version of Figure 9 (a simplified diagram only)*

Secondly, about the famous triad: atoms, ions and molecules. Following the pioneer lead of Gilbert Newton Lewis (around 1920) and more recently of Jacques Monod and others, it is convenient to recognize a major distinction between the covalent bonds between atoms, on the one hand, and the less intimate noncovalent bonds, on the other. Thus—regarding atoms as members of the second integrative level—only *covalently bonded groups of atoms* are ranked as third-level entities (Figure 11). Hence, a water molecule or a glucose molecule and a sulphate or silicate ion are each members of the third level: but a crystal of common salt contains no third-level entities.

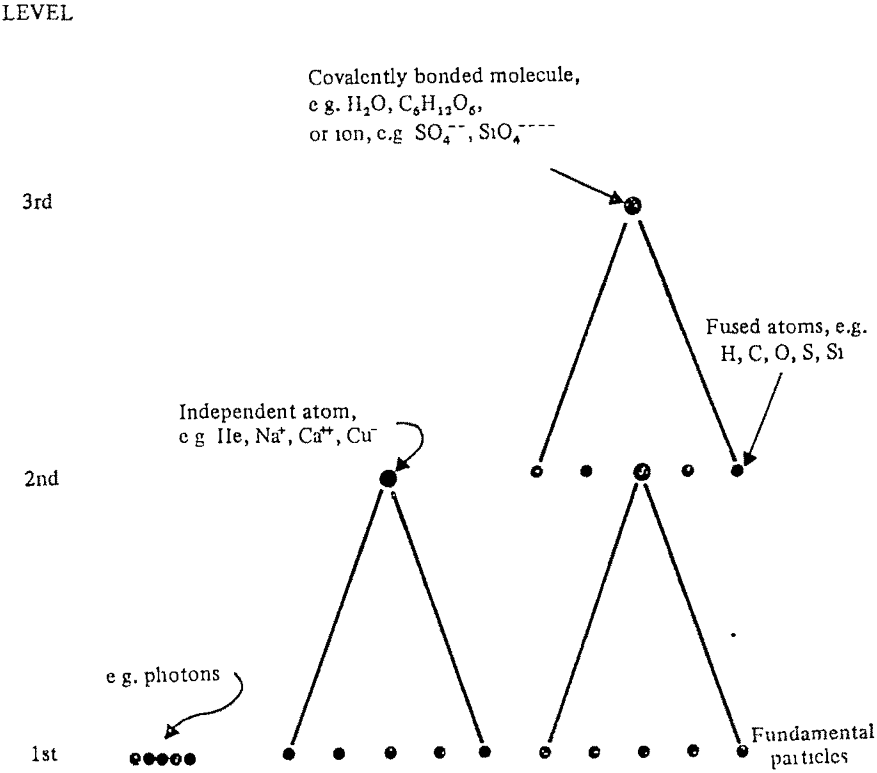
LEVEL
3rd
2nd
1st
Covalently bonded molecule, e g. H_2O, $C_6H_{12}O_6$, or ion, e.g SO_4^{--}, SiO_4^{----}
Fused atoms, e.g. H, C, O, S, Si
Independent atom, e g He, Na^+, Ca^{++}, Cu^-
e g. photons
Fundamental particles

FIG. 11: *Major integrative levels 1, 2 and 3: the physical range*

With the first three major integrative levels occurring in the physical range of disciplines, or in the range of physics plus chemistry, levels four, five and six occur in the biological range (Figure 12). Intermediate entity is a convenient term for members of level 4, which are intermediate in level between ordinary cells and molecules. Each bacterial cell, chloroplast and mitochondrion is regarded as an intermediate entity. And for a leaf cell, for instance, if one deducts its chloroplasts and mitochondria, then the remainder of the cell is

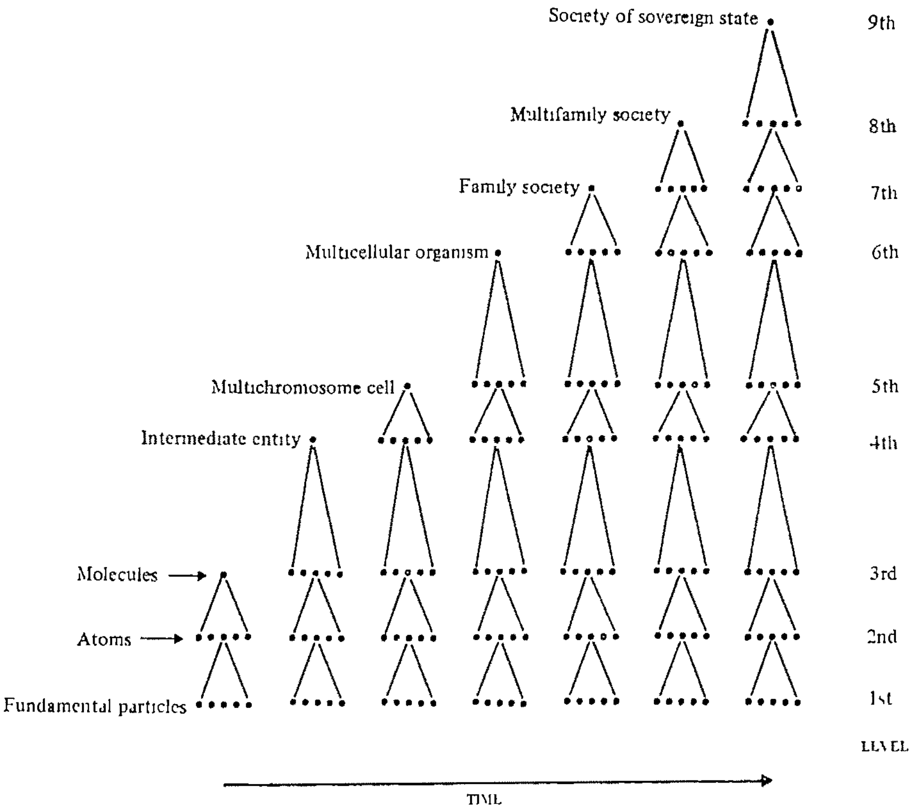

FIG. 12: *This rather simplified diagram (see text) is about the material composition of a wide range of natural entities, from the first to the ninth major integrative level. There is a horizontal (non-quantitative) axis of time. (The conventional five or so dots of course stand for two, several or many entities; and when a whole has an exceptionally large number of parts, the triangle is sometimes drawn extra tall)*

considered to consist of as many intermediate entities as there are chromosomes in the nucleus. For a discussion of the status of viruses, please see *Mainstream Hierarchy* p. 45–9.

At a higher level still are the 'social associations', as Needham called them, which are seen in many species of animal, including man. Professional biologists *are* of course now unanimous in agreeing that humans have evolved from other animals, as proposed by Charles Darwin in 1871. Applying the two criteria, it is found appropriate to recognize *three* major integrative levels, among the various domiciliary societies, and no more than three. Among robins for instance, or among honey bees, there are independent one-mother societies. These are independent seventh-level entities. But among termites, some ants and various mammals there are independent societies each containing more than one reproductive female or mother. Consisting of closely fused groups of two or more seventh-level entities, these larger societies rank as eighth-level entities.

Such multifamily societies have been much studied, and Edward O. Wilson in *Sociobiology*[6] provides helpful pictures which have been drawn by Sarah Landry from research data. Thus the picture on p. 436 of *Sociobiology* shows two reproductive females, two queens, among the other termites in a small portion of one of the gigantic termite edifices. Among mammals, p. 532–3 show two multifamily societies of ring-tailed lemurs. They are keeping sedulously distinct from each other, despite proximity. Pages 540–1 give an excellent view of a multifamily band of mountain gorillas, as studied by George Schaller. Some of the young, like human children, are playing games such as 'follow my leader' and 'king of the castle'.

The series also contains an artist's impression of an African hunting scene involving *Homo habilis* or Handy Man (p. 570–1). Members of this species, ancestral to our own, were apparently making stone tools by some 2,000,000 years ago. Certainly the extant food-gathering people, as of the Kalahari Desert and in parts of Australia, normally live in similar multifamily societies—that is in entities of the eighth major integrative level. Pre-agricultural humans, like the mountain gorilla, tend to move from place to place and do not normally inhabit permanent settlements. But when crop agriculture became important, the society of a wandering band became the society of a settled neolithic village. That, too, will have been inhabited by a multifamily society. Nowadays, of course, the societies of settlements are fused together to constitute the society of a sovereign state, at a still higher level. There are now between 100 and 200 sovereign states in the world, though there used to be far more. The number of sovereign states is roughly, though not exactly, the number of members of the United Nations. The three categories of domiciliary society which I find it appropriate to recognize as major integrative levels are described in chapters 5 and 6 of *Mainstream Hierarchy*. Well developed ninth-level entities seem to occur only in *Homo sapiens*, but entities of the seventh and eighth levels do occur in many vertebrate and invertebrate species.

In all, it is nine major integrative levels which have come to be recognized, by carefully employing the two special criteria (the duality and the compositional criteria) plus general knowledge and common sense. In the space here available, it is not possible to define them rigorously. But it is rather fascinating to follow the progressive development of these ever-more complex entities on the planet Earth. Figure 12 provides a useful summarizing statement, with time advancing from left to right. As the diagram reminds us:

> Once upon a time there were only fundamental particles, atoms and molecules. Later on some of these formed into one-chromosome cells,
> which gave rise to multichromosome cells,
> which gave rise to multicellular organisms,
> which gave rise to one-mother family societies,
> which gave rise to multifamily societies,
> which in *Homo sapiens* gave rise to even more complex societies.

And in so far as the progression, from molecules and small cells up to complex societies, can be regarded as the 'main stream' of evolution, the hierarchy which gets built up can be referred to as the 'mainstream hierarchy'. Figure 13 gives some indication as to how long ago it was that each new kind of more complex entity first appeared.

Many neolithic villages no doubt did contain autonomous and independent multifamily societies. Indeed a few very primitive villages are still virtually independent today. But when the societies of several human settlements had fused politically, and there was sufficient differentiation for there to be (in a sense) full-time administrators, we may say that the society of a sovereign state had emerged. In fact the earliest known society of a sovereign state seems to

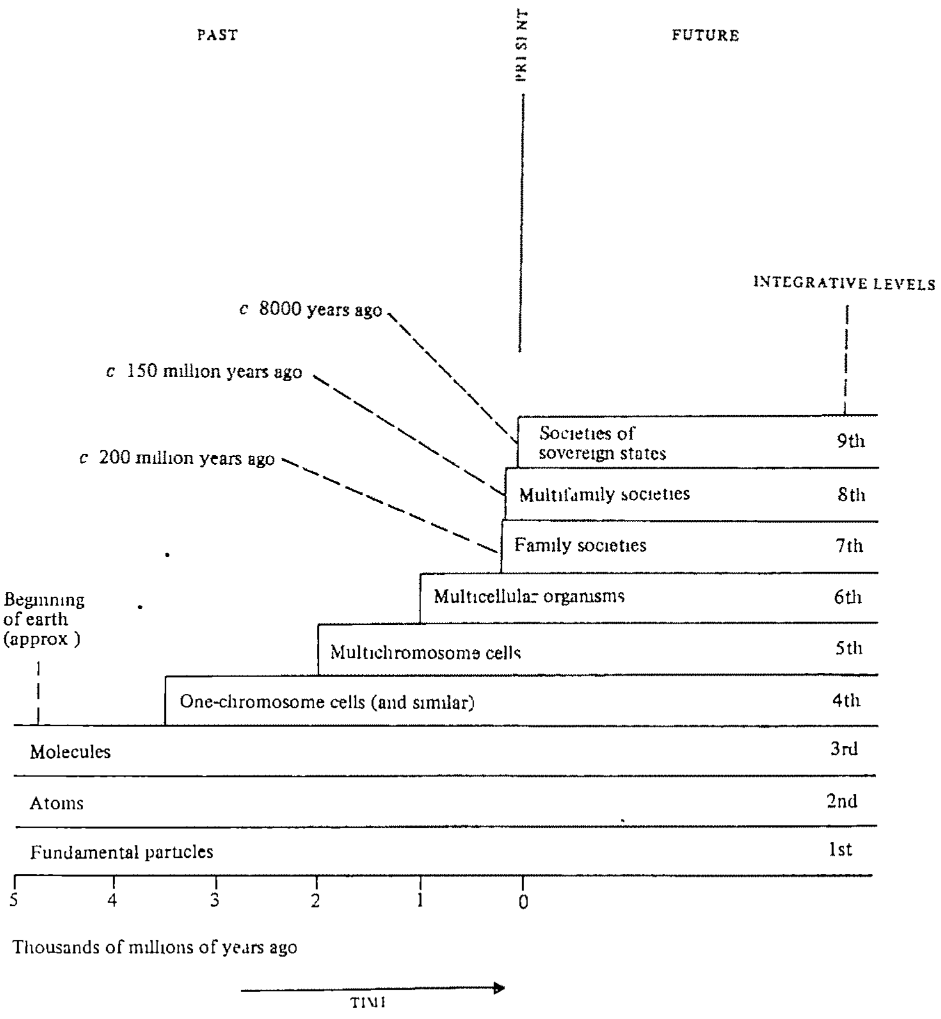

FIG. 13: *'Layer-cake diagram' showing the approximate times of appearance, on the planet Earth, of progressively more complex entities*

have been that centred on neolithic Çatal Hüyük, in Turkey, according to the excavations of James Mellaart and by extending a little further the customary arguments of social archaeology. *Scientific American* reprint number 620, from April 1964, provides helpful illustrations.

So there have been societies of sovereign states—if we use the dating of Çatal Hüyük—for some 8,000 years. Certainly such chiefdoms or kingdoms usually existed before the advent of writing in the areas concerned. For instance, in Iron Age Britain, before Roman times, Barry Cunliffe notes the division of present-day England and Wales into sixteen such territorial polities, ranging from the Cantiaci (whence the name Canterbury) up to the Brigantes of northern England.

Referring to the same period, at Butser in Hampshire there is now an interesting simulation of a well-to-do, Iron Age farmstead, with its round house and plots of cultivated land. Such houses are some ten metres or more across. Evidence is accumulating, however, that even in the Late Neolithic period in Britain there were already, in effect, multisettlement polities or sovereign states, where a class of astronomer-priests and wise men operated immense public works programmes, and in the Highlands and elsewhere as well as on Salisbury Plain. See for instance Euan MacKie's new book on *Science and Society in Prehistoric Britain.*[7] On p. 155 he shows the plans and the reconstructions of two of the large round wooden houses, from the Neolithic period, at Durrington Walls, from which the organizers of Stonehenge and Woodhenge may have operated. The larger was as much as forty metres across, being a circular building, perhaps with a small, open courtyard in the centre. So this rather special Late Neolithic building has several times the diameter of a typical Iron Age farmhouse, such as flourished in Britain nearly 2,000 years later. I mention these points merely to emphasize that ninth-level entities seem to have occurred in Neolithic Britain by 4,000 years ago, as well as in Neolithic Turkey by 8,000 years ago.

As mentioned before, by applying the two special criteria (the duality and compositional criteria) one obtains nine major integrative levels. The members of the levels are rather approximately described in Figure 14, which also gives

9	society of sovereign state	*so*
8	multifamily band, etc.	*po*
7	one-mother society	*no*
6	multicellular organism	*mo*
5	multichromosome cell	*lo*
4	one-chromosome cell, etc.	*ko*
3	covalent molecule or ion	*jo*
2	atom	*go*
1	fundamental particle	*fo*

FIG. 14: *The nine major integrative levels; condensed descriptions of the full members of each level; and the new short code-names for the nine kinds of integrated natural entity*

the short monosyllabic designations for the different kinds of entity. I would have preferred one-letter symbols. But the single letters of our alphabet have been getting rather overworked: many single letters have quite a range of special and different meanings already. So it seems necessary to use two-letter code-names as second best. The symbol *mo* is, in fact, an acronym from 'multicellular organism'. 'Society of sovereign state' condenses easily to *so*, while *fo* stands for 'fundamental particle'. Hence this series of entities can be referred to as the *fo-so* series. For more precise definitions, if required, please see the published account in *Mainstream Hierarchy*. This *fo-so* series provides a taxonomic synthesis right across the physical-cum-chemical range, the biological range and the social range of disciplines. (The monosyllabic term *fo* is pronounced as is the English word 'foe'; and the plural *fos* is pronounced as is 'foes'.)

Perhaps I should apologize for the neat 3+3+3 structure of the series, which has happened to turn up (Figure 14). But I regard it as only temporary. The lowest category may soon be replaced by two, due to further research; and another category may later be added beyond the present ninth, by further social evolution.

A proper or full member of any of these nine major integrative levels I have come to regard as an 'integrated natural entity'. And the cumbersome ten-syllable term 'in-tegrated n-atural ent-ity' I now sometimes contract to 'innent'. Compare the derivation of 'radar' for instance (Figure 15). One also recognizes, by the way, some members of most levels which are only incipient members, as opposed to proper or full members.

in-tegrated n-atural ent-ity
innent (1970s)

ra-dio d-etection a-nd r-anging
radar (1940s)

FIG. 15: *Two derivations*

This use of major integrative levels to assist an improved classification of our ideas and knowledge will, I believe, prove quite helpful in the social and natural sciences. I should add that most of my professional colleagues do not know about it yet; but those who do have found no flaws in the chains of reasoning. It will be interesting to hear, later, whether the new classification suggests any eventual change in indexing practice.

However, once one has taken the trouble to perform the classification, there is an unexpected pay-off. For several numerical conclusions now obtrude themselves, and I should like to mention three briefly in conclusion.

The first concerns the rate of biological, social and cultural evolution, and a more detailed account appears in the April 1978 issue (vol. 1, no. 2) of the new *Journal of Social and Biological Structures*[8]. We have become conscious of an acceleration in cultural change in recent times. And some specialists have noticed that the acceleration commenced even before the beginning of agriculture. Well, there is now evidence of a general long-term acceleration over most of the period of biological and social evolution. The layer-cake diagram (Figure 13) itself suggests an acceleration of change since the flight of steps, from level to level, seems to become steeper. But there is a possible criticism that one might perhaps have inadvertently recognized too many levels in some regions, and too few in others. So, in August 1976, it was decided just to plot the estimated mass (or weight) of the first member of each new level, against the estimated time of its emergence. And the result of this operation will *not* now depend on the number of levels recognized.

Figure 16 shows the result of plotting the mass of 'innovatory entities' against time—from the first bacterium-type cell to the first society of sovereign state. It is quite remarkable what a simple and clear picture emerges. Whether one considers the 'uncertainty rectangles' as whole blocks or just considers the points, the entries do form a consistent sequence. In this diagram a logarithmic axis of mass has been used. So, if the progress curve had been a straight line, it would have indicated steady acceleration with regard to the mass of new entities, as with exponential growth. But, in fact, the evolutionary progression takes the form of a curve tilting upwards. So the acceleration has been faster than exponential.

Such technical statements are all very well. It is salutary to replot most of the points of Figure 16, using a straightforward arithmetic axis of mass, as in Figure 17. A dotted line shows the course which might have been followed, but was not, with equal increases in mass over equal periods of time. In this diagram the degree of departure of the actual trend, from the dotted straight line, shows how acceleratory the trend actually was.

A well-known way of describing a rate of acceleratory growth is to mention the doubling time. Thus, the evolutionary trend across Figure 16 starts with a doubling time, between the first and second point, of 150 million years. From there to the third point it was 75 million years—already faster. From first multicellular organism to first mammalian family it was 30 million years. And from the first family to the first society of sovereign state the doubling time was only about 12 million years.

This article is primarily a report of a talk given at ASLIB headquarters in June 1977. But the writer would like to add a postscript about results not obtained until February 1978. Some ancient doubling times were mentioned above. They represent progress among the fastest evolving lineages of the periods concerned. But if one now goes on to consider:

(a) the doubling times—over the past 2,000,000 years—of the number of humans in the world, or in the world's largest settlement; and then

(b) the doubling times—over the past 10,000 years—for various human cultural advances;

it is found that the spearhead accelerations of all these three categories fall into a consistent sequence. Many writers such as Paul Ehrlich, Donella Meadows, Alvin Tofler and others are worried about present trends and about the present rates of change. But it is now apparent that numerically *the recent accelerations are no more nor less than the continuation of a series of accelerations which date from the earliest times of life on Earth.* It is as though acceleration in change is a built-in feature. The writer does not regard this as particularly good news; but it will certainly need taking into consideration in forward planning. According to

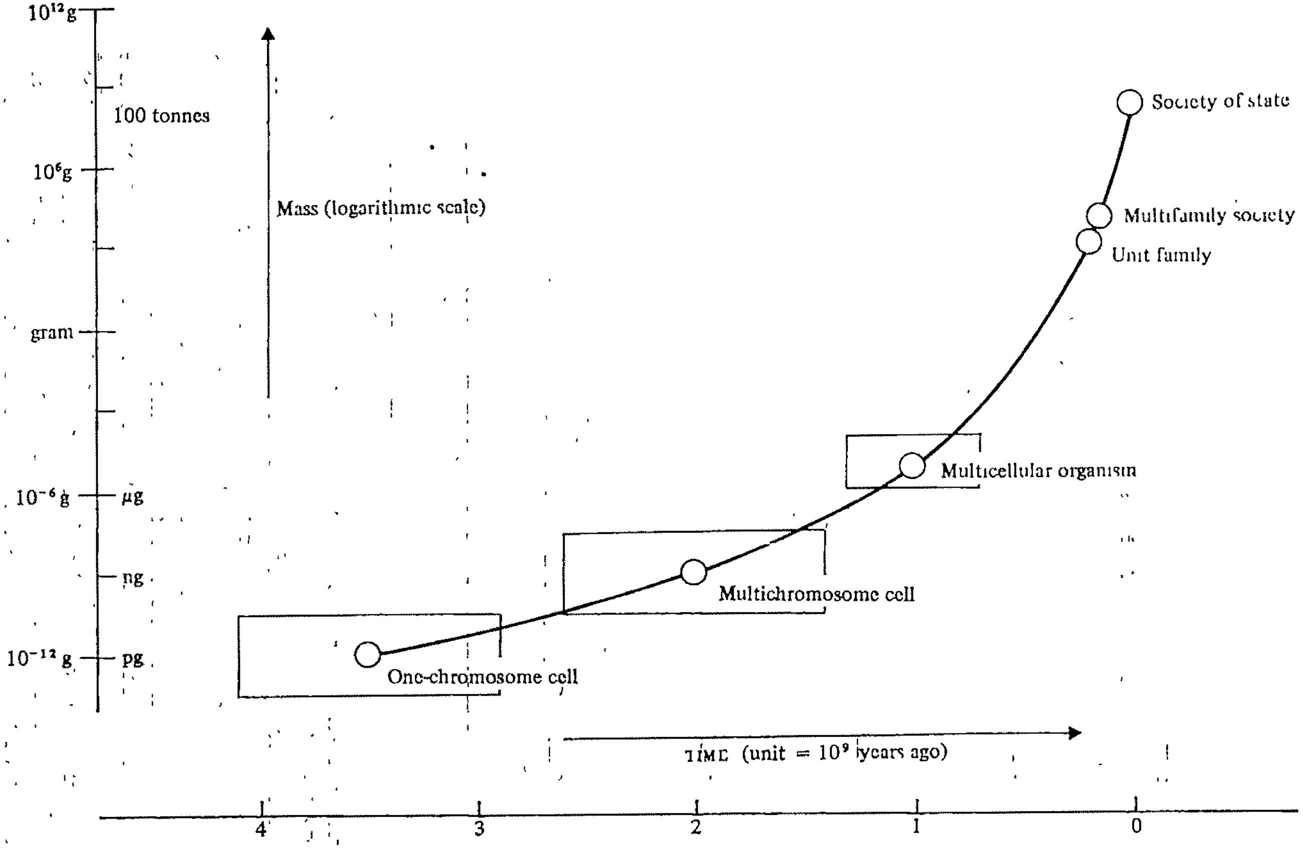

FIG. 16: *Plot of* (a) *the supposed time of first appearance of various biological and social entities, against* (b) *the supposed mass of the first entities of each kind. There is of course immense uncertainty as to just exactly where the first three points should lie. But it seems at least 95 per cent probable that they belong somewhere within the rectangles shown*

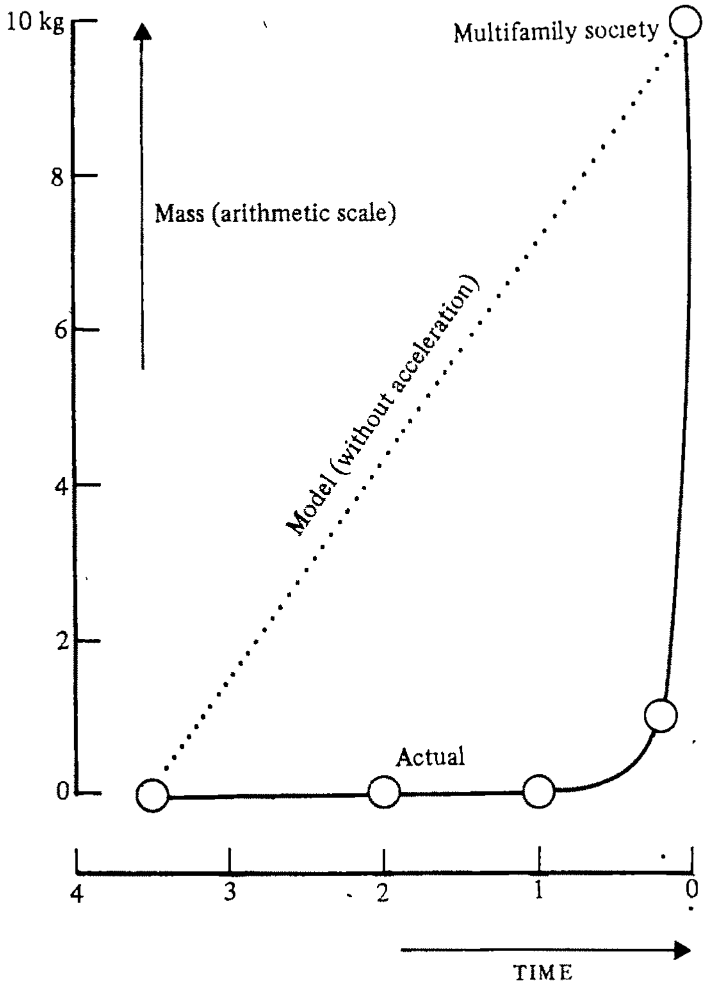

FIG. 17: *The same progressive developments, now with an arithmetic axis of mass (Time unit* = 10^9 *years ago)*

Sir Ieuan Maddock, Secretary of the British Association for the Advancement of Science, the doubling time for the number of scientific articles published each year, in the free world, is now only nine years. This is very different from the doubling time of 150 million years mentioned earlier. But the two values now appear as members of the same accelerating series.

The second main and distinctive quantitative finding concerns the frequency distribution, with regard to mass, of the entities *within* a single major integrative level. Whether in the solar system or in the universe in general, it is well known that the lightest atom, hydrogen, is the commonest, while the next lightest, helium, is the next commonest. From published tables it is easy to construct a histogram showing how there are many light atoms

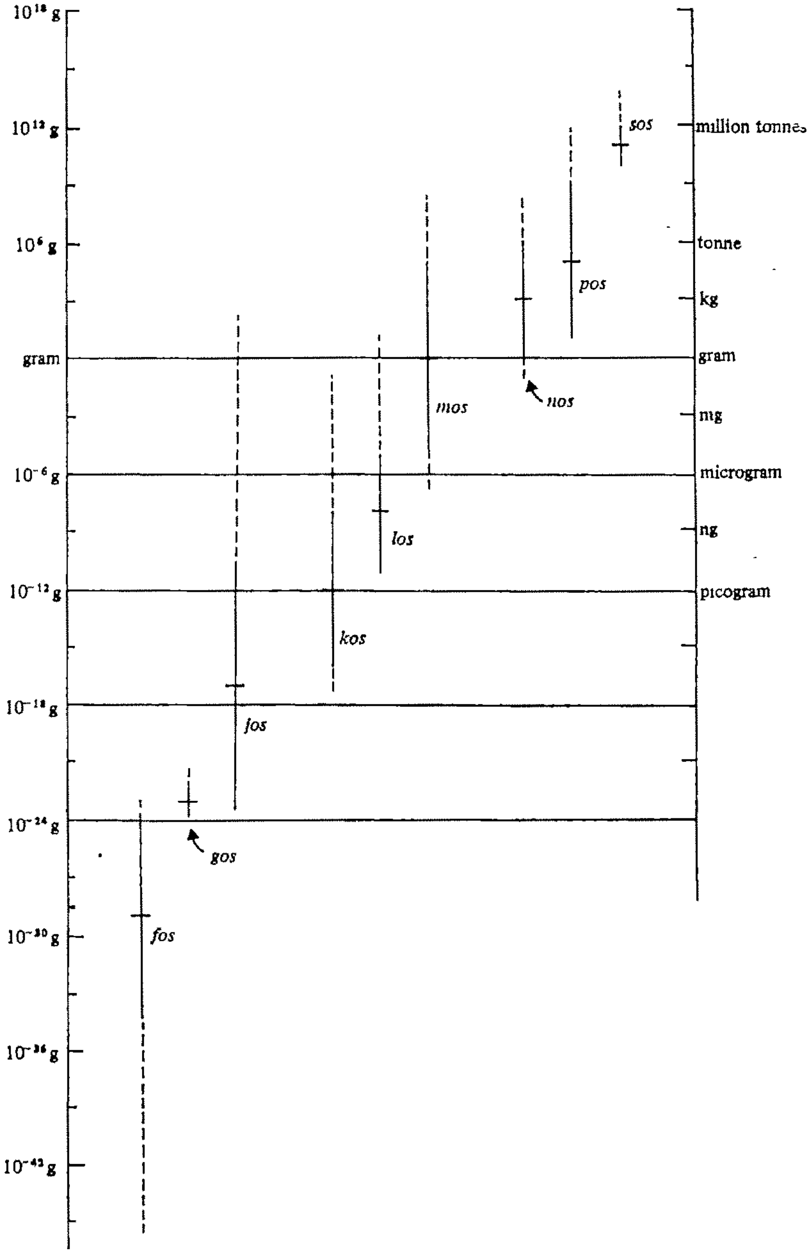

FIG. 18: *Summary of the ranges of mass of members of each of the nine major integrative levels. The 'characteristic mass' for each category is also marked, by a short line bisecting the main range*

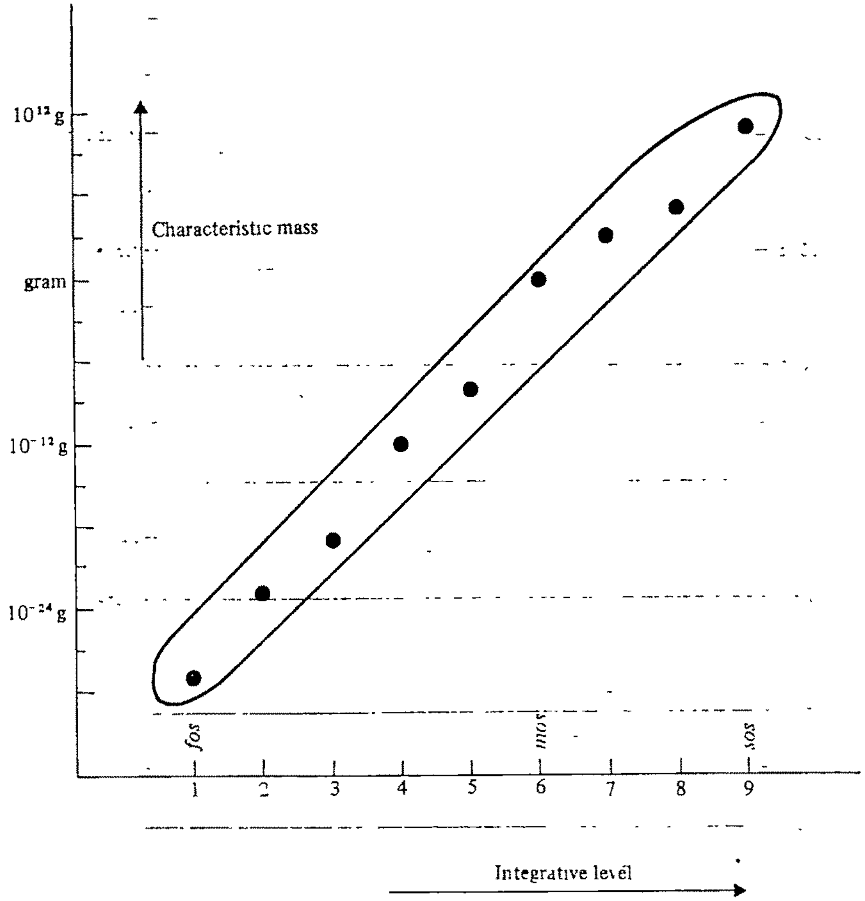

FIG. 19: *The 'characteristic mass' of each kind of entity is here plotted against its integrative level. This 'cigar diagram' helps to illustrate the point that the nine kinds of entity (the* fo-so *series) do in fact form a coherent and consistent series*

but only fewer heavy ones. (This and related histograms are given on p. 105–8 of *Mainstream Hierarchy*.) With the hump on the left, one speaks of a 'positively skew distribution'. But for societies of sovereign states (at level nine) there is also a positively skew distribution with regard to mass. In fact this positive skewness occurs in *all* the major integrative levels. And at the level of fundamental particles, the recent discovery of psi particles (which was awarded a Nobel Prize in 1976) makes the positive skewness more conspicuous at that level than it was before.

A third line of study is to consider the ranges and the absolute values of mass of entities of each of the nine major integrative levels, at the same time. One way is to display them as nine entries, along a logarithmic axis of mass (Figure 18). Apart from the total ranges, the 'main ranges' have also been

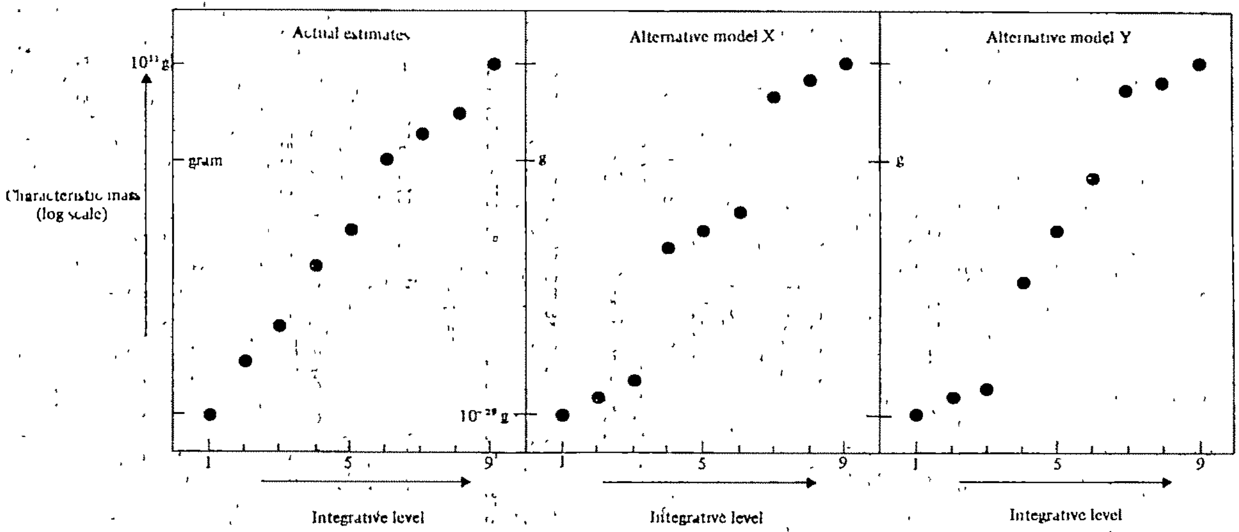

FIG. 20: *In model X and model Y the points for the physical, biological and social ranges of entities seem to fall into three distinct groups. But the points for these three well-known ranges do* not *fall into three distinct groups when (on the left) the actual estimates are considered*

marked in, rather arbitrarily, as continuous lines. In each case the midpoint of the main range has also been marked, and this value will be referred to as the 'characteristic mass' of entities of that level. In fact, of course, the characteristic mass equals the geometric mean of the maximum and minimum ends of the main range. As an afterthought it was decided to try plotting 'characteristic mass' against number of integrative level (Figure 19), and it came as quite a surprise that the series of nine points lies not far away from a nearly straight line. Certainly they are not actually on a straight line: but would you expect them to be? Indeed, if after working through all the calculations about biological entities and societies, someone came up with a report that these points were *not* scattered a bit on each side of the regression line, one would be inclined not to believe it. The same points are replotted, in the left-hand portion of Figure 20, while the other two rectangles show made-up models. And I think the chief point of interest that emerges is that the points for the physical range, for the biological range and for the social range do *not* seem to hold apart in three distinct groups, as they do in model X and in model Y. On the other hand the nine categories *do* seem to constitute a coherent and consistent series. Indeed, these investigations and several others all serve to confirm that the *fo-so* series is indeed a coherent and consistent series. In one of his later communications Lancelot Hogben commented that the different compartments such as the physical, the biological and the social sciences, seemed to be three quite separate worlds: a 'trinitarian' view, as he called it. My reply, stressing the 'unitarian' coherence of the series of entities concerned, is further strengthened by the present quantitative studies (*J. Inst. Biol.,* August and November 1958).

Referring back to the way the nine points lie nearly in a straight line, one can, if one wishes, say that the characteristic mass (m), of entities of the n^{th} major integrative level, is approximately given by the formula

$$m = 10^{(pn+q)}$$

where p is about 5, and q (if one uses kilograms) is about −37.

Hogben in 1958 noted the difficulty of finding a 'simple formula' to encompass the diversity of science. 'In my sixties,' he wrote, 'I find it increasingly difficult to find a unitarian formula for the trinitarian diversity of now respectable thinking called science. . . .' Today, in the sixties myself, I do happen to be able to offer this simple unitarian or unifying formula which does in fact link up gravimetrically a range of entities as wide as from fundamental particle . . . right up to society of sovereign state. And, with the larger mass characteristic of each successive kind of entity, goes of course greater complexity of structure and a corresponding greater complexity and potency of properties. The key to this simple unifying formula has been the theory of integrative levels.

Not long ago Mr Jolley wrote, prophetically, that he hoped further laws (or generalizations) about integrative levels would eventually be forthcoming. They would (he wrote) give the student . . . something to get his or her teeth into. If he had lived, I hope he would have found the present offerings of interest.

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DISCUSSION

ALAN J. MAYNE (Transport Studies Group, University College London: An analogy from computer science may be helpful. Imagine a computer program that calls subroutines 1 and 2, and suppose that subroutine 1 also calls subroutines 3 and 4. It seems at first sight that the main program is at the top level, subroutines 1 and 2 are one level lower, and subroutines 3 and 4 are two levels lower. However, if subroutine 4 is also called directly by the main program, then it is no longer clear what its level should be. This simple example illustrates the sort of difficulties that are liable to arise in the theory of integrative levels. In fact, this theory should be viewed as a first approximation at best, applicable only in certain situations; thus it is a good servant but a bad master. The situation becomes even more complicated when one allows for the possibility of recursion, where, *e.g.*, a subroutine is able to call the main program itself.

Personally, I believe that the universe not only cannot be analysed in terms of uniquely definable integrative levels but that it is also recursive. Thus, it can be described only by means of a non-static, evolving system of concepts, representable as a dynamic, growing network, and definitely not as a fixed hierarchy.

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Aslib Proceedings now accepts contributed papers in addition to those presented at Aslib meetings and conferences. They should be of a practical nature and of some relevance to problems encountered in the everyday operation of library and information units, or services. Other kinds of contribution which will be considered for inclusion are short notes on new information units or special libraries; the introduction of new techniques or systems in existing libraries where these may be of general interest; equipment designed by members for special purposes and put into operation in their own organizations; and objective reports on experience with new 'packaged' commercially available information services.

Contributions, which should be typewritten, double spaced, single-sided on A4 paper, and not more than 3,000 words in length, should be addressed to the Editor, *Aslib Proceedings,* 3 Belgrave Square, London SW1X 8PL. If possible, authors should include a summary of up to 200 words with the typescript. Authors will receive twenty-five offprints of their article free of charge.

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CENTRAL

Editorial

DURING THE LAST FEW YEARS Editors have discouraged the writing of papers on 'how I run my library good'. Unfortunately this has resulted in a dearth of literature on what goes on in special libraries, in spite of recent changes affecting operations, e.g. availability of external services, increased mechanization and economic constraints.

Special librarians *are* interested in what other libraries are doing and how they can improve their own services.

Several special librarians were invited to write papers for a series on Library Information Management. However, the editor would welcome articles (3,000–4,000 words) from other librarians who feel they can contribute.

A check list has been prepared to indicate the range of information required:

1. *Organization and Management:*
   - (a) Main objectives of library and information service.
   - (b) Main parameters of parent organization; position of library in parent organization; reporting chair.
   - (c) Internal organization and physical arrangement.
   - (d) Staff organization.
   - (e) Financial management.
   - (f) Performance monitoring: Planning.
2. *Services provided to users:*
   - (a) Type of service—reference, lending, retrieval, dissemination, other.
   - (b) Techniques—manual, mechanized.
   - (c) Use of external services.
   - (d) User characteristics.
3. *Special functions of Librarian or Information Manager:*
   Responsibility for publication: report editing; printing and photographic units; translation unit; patents; etc.
4. *Library publications*

Further information is available from Margaret Raffin, Editor, Aslib, 3 Belgrave Square, London SW1X 8PL.

Library and technical information services: the Water Research Centre

L. E. Newman

Technical Information Section

Paper prepared for the series on Library Information Management

The Water Research Centre (WRC) provides the major part of the research needs of the British water industry. The history, present structure, source of finance and scope of research of the Centre are presented. The Member Services Division communicates the results of research work to the members of the Centre through library and information services, technical liaison, publications and by organizing conferences and other events. The Technical Information Section staff are located in two laboratories and the Section produces the weekly abstracts journal *WRC Information*, in addition to providing library services, technical enquiry services and computerized SDI and literature-searching facilities. The WRC is using ASSASSIN to carry out these functions and to create a specialized water data base, and emphasis is given in the paper to the importance of exchange agreements with equivalent organizations overseas. The Centre complements its own data base by using the commercial on-line searching services. Staffing, financial budgeting and performance monitoring are considered.

Background

THE WATER RESEARCH CENTRE (WRC) is the national organization financed on a membership basis mainly by the British water industry, to provide the major part of its research needs.

The Water Act 1973[1] brought into being the ten Regional Water Authorities covering England and Wales, which are responsible for water supply, sewage disposal and the amenity use of water in their region. The water companies which remained operate as agents under agreement with the regional authorities. The Act made it clear that the new water industry was expected to make fullest use of research in order to carry out its functions with the maximum of efficiency and economy and each Regional Authority was directed to 'make arrangements for the carrying out of research' and empowered to make such arrangements 'by subscribing or otherwise financially contributing to an organization formed for that purpose'.

Accordingly, in April 1974, the formation of the Water Research Centre brought together the activities of the Water Research Association at Medmenham, Buckinghamshire, the Water Pollution Research Laboratory in Stevenage and part of the Water Resources Board in Reading. It has available the buildings, equipment and facilities which existed at Medmenham and Stevenage. Membership of the Centre is open to all water authorities and statutory water companies in the United Kingdom and to all organizations having an interest in water.

It is a limited company under the Companies Acts, with an elected Council which is in effect the board of directors. There is also a Research Advisory

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Committee (RAC) which advises on the research programme of the Centre, a Water Authorities' Panel (WAP) and a Management Committee. The Department of the Environment/National Water Council Standing Technical Committees advise the RAC and the WAP in their respective subject areas of research.

The Centre has a subscribing membership of over 300 organizations which include the ten Regional Water Authorities, Scottish Regional Councils, Department of the Environment for Northern Ireland, water companies, consulting engineers, private companies with interests in the water industry and educational institutions. The major part of the subscription income is provided by the ten Regional Water Authorities and about one-quarter of the members are from overseas. The present staff complement is over 530 and during 1976–77, the income of the Centre was £5.2m, of which subscriptions provided £3.3m, Department of the Environment grant £0.7m and repayment work just under £1m, most of which was carried out for the DOE.

The WRC research programme covers the whole spectrum of the water cycle, from water as a resource, its collection, treatment and distribution to the consumer, to the treatment and disposal of the waste water and environmental effects on rivers, coasts and estuaries. The Director of Research is based at the headquarters office in Henley-on-Thames and each laboratory is headed by an Assistant Director. There are eleven research divisions (Table 1) and divisional managers report to the Assistant Director of the laboratory in which they function. Several research areas are of interest to both laboratories and there is close collaboration and liaison between research staff. Joint projects and services are provided, *e.g.* in the Distribution and Operational Research and Economics Divisions, where studies relate to all major components of water supply and effluent disposal.

The Water Research Centre has always firmly held the belief that research is not conducted in a vacuum, and to be of value, research results must be communicated. The Member Services Division has the responsibility for seeing that the results of research work are communicated to the members of the Centre and for making available the expertise of the research staff to overcome current problems. The manager of the Division is based at Stevenage but has divisional manager status in both laboratories. Staff of the Division are located

WRC RESEARCH DIVISIONS

Medmenham laboratory	*Stevenage laboratory*
Resources	Processes A
Treatment	Processes B
Distribution	Pollution A (fish studies)
Water quality and health	Pollution B (rivers)
Operational research and economics	Pollution C (coasts and estuaries)
	Laboratory services
Member services	

TABLE 1: *Research divisions*

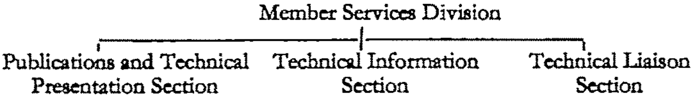
Member Services Division
Publications and Technical Presentation Section
Technical Information Section
Technical Liaison Section

TABLE 2

equally in both laboratories and are organized into three sections: Publications, Technical Information and Technical Liaison (Table 2). The Division complements the activities of research staff by providing library and information services, technical liaison, publications and by organizing conferences, regional meetings, open days and training programmes.

The Publications and Technical Presentation Section produces over 200 reports and papers a year to ensure that members are aware of the innovations, information and services available as the result of work paid for by their subscriptions. The major WRC publications and their availability are presented in Table 3. The Section organizes two or three conferences during each year, in addition to regional meetings at which one topic is presented at a series of eleven or twelve locations throughout the British Isles. Smaller seminars and meetings are held throughout the year and for three days each year the Centre demonstrates its work and capabilities during the Members' and Open Days. The work of the Centre is also publicized at home and abroad at exhibitions where water industry people will be present.

Technical Liaison Section

The Technical Liaison Section brings together the expertise of research staff and the needs of the man in the field. Technical Liaison Officers (TLOs) are

PUBLICATION	AVAILABILITY	
	Members	*Non-Members*
WRC Information: weekly abstracts journal	Free	£35 p.a.+postage
WRC Newsheet and Notes on Water Research: bimonthly	Free	£5 p.a.+postage
Technical Reports (*TRs*): the results of specific research work	Free	Not normally available
Enquiry Reports (*ERs*): report of work carried out in response to enquiries made by members	Free (some *ERs* are confidential to the original enquirer)	Not normally available
Occasional Reports (*ORs*): Literature surveys, bibliographies and publications lists	Free	Various prices
Reprints: work by WRC staff published in the scientific and technical press	Free	Free

TABLE 3: *WRC publications*

located in regions in the United Kingdom and it is their responsibility to help identify current problems in the water industry and to mobilize advice and practical assistance from the WRC. At any one time, the TLOs are co-ordinating over 150 projects, which involve site visits to the problem areas to assess possible means of effectively overcoming the problem and to give advice based on the expertise and knowledge of research staff. The Section is responsible for the development and promotion of new techniques and may assist research staff in the field work which is a necessary part of most research projects, especially where they involve co-operation with water authorities who make facilities available to WRC staff.

Technical Information Section

The Technical Information Section provides a full range of library and enquiry services, including the weekly abstracting bulletin *WRC Information*, both to members of the Centre and to WRC staff. It has a staff of twenty-three and a breakdown is given in Table 4. Five of the library assistants and one of the clerical staff are part-time. With the Section located in two laboratories fifty miles apart, communication between staff must be maintained at a high level with joint projects and regular meetings where possible. A weekly Section report is circulated to all staff.

Liaison with other services

The Regional Water Authorities run library and information services, as do the Central Water Planning Unit of the Department of the Environment and the National Water Council, the central co-ordinating, consultative and advisory body. Continuing liaison between the WRC and the other services is ensured by the Water Industry Librarians and Information Officers Group (WILIOG), which has representatives from all thirteen interested organizations meeting every few months to discuss mutual problems and areas where co-operation leads to the most effective library and information services for the water industry. In general the water authorities aim to meet the local needs of water authority staff and concentrate on the legal, management and administrative

	Medmenham	*Stevenage*	*WRC total*
Technical Information Manager		1	1
Librarians	1	1	2
Library assistants	4	4	8
Information officers	3	3	6
Editor of *WRC Information*		1	1
Indexer and Thesaurus Compiler		1	1
Clerical support	2	2	4
TOTALS	10	13	23

TABLE 4: *WRC Technical Information Section staff*

side of the water industry, with the National Water Council giving them the essential back-up so that there is a minimum of duplication with the WRC's largely technical collections. The Group has published a union list of journal holdings and a combined catalogue of book and report stock is under discussion. Working parties are formed within the Group to carry out specific projects such as the production of standards for Water Authority Library and Information Services. A working party is at present considering all factors relating to the provision of services and will recommend minimum levels for staffing, library stock, etc. in relation to the size of a water authority. It will indicate what services can be provided with that minimum and the numbers of staff required to provide (specified) additional services.

Library activities

The WRC Technical Information Section provides a full range of library activities, both laboratories housing comprehensive collections of books, journals, reports, standards and pamphlet material. In addition, a small library is maintained in the head office in Henley-on-Thames, the selection and acquisition being the responsibility of the Librarian at Medmenham. The library stock reflects the history of the Centre and at Stevenage there is a good collection of older material, much of which is kept in reserve stock, as well as current material on waste-water treatment. The collection at Medmenham dates from its inception in the early 1960s. Both libraries hold reference and loan material and the subject coverage is very wide, with most scientific disciplines playing an important part in the study of water and waste water. There are 28,000 accessions at Stevenage with 1,250 volumes of bound journals and at Medmenham the collection numbers some 32,000 books and pamphlets and 2,000 bound volumes of journals.

The biggest problem facing the librarians at the Centre is the incompatibility of their classification systems. A very simple system of six subject groupings has continued at Stevenage since its origin, with an alphabetic subject index, whereas Medmenham classifies its stock by UDC and has a full classified catalogue of holdings. Work has started on a combined catalogue of the libraries and it is hoped to replace some of the conventional library indexes to current material with computer-generated indexes using the ASSASSIN suite of programs. A weekly list of Medmenham and Stevenage accessions is distributed to research staff.

Since its inception, the WRC has provided a full loans service to all its UK members. On the occasion where an item is in heavy demand, a copy of the contents page plus full bibliographic record is supplied and the enquirer has the choice of attempting to obtain his needs locally or adding his name to a waiting list for the WRC accession. The Centre makes extensive use of the services provided by the British Library Lending Division and in 1977 Medmenham requested 1,000 items and Stevenage 600. The majority of these requests are from WRC research staff. Both libraries scan the journal and publishers' literature for selection of new material and a number of items are purchased at the request of staff. In 1977 Medmenham added 2,000 items to its stock and Stevenage some 1,500.

Publications

In 1927, the Water Pollution Research Laboratory commenced publication of *Water Pollution Abstracts*, a monthly journal which continued for forty-seven years until the formation of the Centre. From April 1974, *Water Pollution Abstracts* was replaced by the weekly publication, *WRC Information*, with the aim of producing a fast, reliable alerting service to those engaged in all sections of the water industry. Currently the Centre receives 500 journals which are scanned by information staff to select items for abstracting. There is no attempt at blanket coverage and only articles which are considered to be of value are selected. Abstracts are written by both research staff and by a small group of other abstractors, who meet every three months to discuss problems. The Centre can cope with all near-European languages and a translation is made initially of the contents pages of other foreign language titles, with a prepared abstract following if relevant. A number of library accessions are selected for inclusion in the bulletin, so that the coverage includes books, reports, standards and conference proceedings. The scope of *WRC Information* is further enhanced by information exchange agreements with water institutes in Europe, Scandinavia, Canada, USA and Japan. Through these agreements WRC has access to a unique collection of reports and papers and the exchange, with the National Institute for Environmental Studies in Japan, for example, provides WRC with English language abstracts and complete articles from the major Japanese water journals.

WRC Information is distributed to 2,000 members and a further 750 non-members receive it on a subscription basis. The Centre supplies members with copies on request of any journal article abstracted and the photocopying service has been centralized at Stevenage where 65,000 items were despatched in 1977. In addition to abstracts, *WRC Information* contains announcements of services, new WRC publications and future events, conferences, etc. Subject and author indexes are published at six-monthly intervals and it is planned to use the ASSASSIN Articulated Subject Index package from 1978 to prepare up-to-date cumulative indexes.

The Technical Information Section provides a current awareness service to WRC staff, with differing routines at Medmenham and Stevenage. The former library does not circulate journals, but each week distributes contents pages to small groups via a named library representative. The group decides in advance which journals it wishes to receive and there is considerable liaison between research staff and the information staff who select items for *WRC Information* to ensure that no relevant material is omitted. After one week, journals are placed in the library and can be borrowed through the normal loans system. At Stevenage, where the editor of *WRC Information* is based, all journals are scanned for items for inclusion in the bulletin and for items of interest to staff. Journals are displayed in the library for one week, with articles selected for abstracting and those of interest to staff noted on a circulation list. An 'item of interest' list is kept on display and circulated to interested staff. After removal from display, journals can go on a limited circulation but this is not encouraged. A master copy of every article selected for abstracting at each laboratory is kept. Both systems work well and have involved research staff in the least possible change from existing routines while at the same time allowing the Technical Information Section to carry out all its functions with speed and efficiency.

Technical enquiries

The Centre receives annually in excess of 5,000 technical enquiries and within the Technical Information Section are enquiry officers responsible for ensuring that each enquirer receives a full co-ordinated response from the Centre. Some enquiries can readily be answered by the enquiry staff, either where their subject content falls outside the research interests of the Centre and the enquirer is directed to another source of information, or those which by their nature can be fulfilled by consulting the literature or from experience. Enquiries from member organizations which can not be answered by WRC staff can involve the enquiry officers in lengthy investigations to provide the assistance needed. The enquirer may be referred to another organization with the relevent expertise or the enquiry officer may undertake to obtain the information from external sources and present it in the form of a letter, bibliography or evaluative report.

A large group of the enquiries can be directed immediately to the appropriate member of the research staff and the enquiry officers record and monitor the progress of these. The remaining enquiries are more complex and may involve a response from several members of staff, often from two or more divisions and between the laboratories. In these cases, the enquiry officers must co-ordinate the reply and follow the progress of any resulting work. Some enquiries result in considerable research effort and are finally presented as Enquiry Reports, in some cases with circulation restricted to the organization for whom the work was carried out. In 1977, ninety-five Enquiry Reports were listed.

Although the Centre only offers full enquiry services to the subscribing membership, there are non-members who receive assistance, where, for example, it would benefit a member. Advice to a manufacturer with an effluent problem helps the Regional Water Authority, who may indeed have referred the enquirer to WRC.

If an individual or an organization has a real need to know and would not be expected to consider membership of the Centre, then where possible the enquiry officers and research staff will give assistance, particularly if the problem can be solved by a telephone conversation or an immediate letter, although priority must of necessity be given to members. The Centre is, however, able to carry out work on a contract basis and this is occasionally the route by which a non-member has access to the expertise of the Centre.

The enquiry officers must be skilled in identifying the problem behind the statement of an enquiry and great emphasis is placed on giving the enquirer the most practical answer to his problem. It is not always an easy task to obtain the confidence of the enquirer who, in most cases, has not met and does not know the enquiry officer and it is the task of the enquiry officer to make himself as knowledgeable and conversant as possible with all aspects of the WRC research programme as well as interests outside those of the Centre.

All enquiries received are registered with an accession number and a check kept on their progress. A combined Medmenham and Stevenage weekly list of enquiries is circulated to senior staff and close liaison is kept with the Technical Liaison officers, so that they are rapidly informed of problems within their regions. The enquiry unit is also responsible for despatching all requests for WRC publications and in 1977 some 1,650 individual requests were met. A stock of reprinted articles by WRC staff is held and distributed on request.

Mechanization

Shortly after its formation, the Centre realized that it was accumulating a vast reserve of information in the form of abstracts, library accessions and records of completed enquiries. Problems do not come singly and to respond to the same enquiry several times involved a considerable repetition of manual effort. It was decided that some form of mechanized information retrieval system was required to relieve the enquiry officers of this extra effort and free them for the more exacting task of providing information.

The Centre considered the systems which were commercially available and after careful evaluation leased the ASSASSIN[2] suite of programs developed by the Agricultural Division of ICI. The policy was to have a mechanized system which carried out all the routines required by the Centre and involved no one member of staff being devoted full-time to it, at the same time allowing existing practices to be affected as little as possible. It was decided to input to the system by optical character recognition (OCR) and from October 1976 printing of *WRC Information* has been by computer typesetting from a magnetic tape produced by scanning the OCR input. Abstracts are prepared in OCR format using a conventional electric typewriter with a special golfball head and, from this, two magnetic tapes are produced, one for the bulletin printing and one for machine storage of the records. The Centre uses the bureau facilities provided by ICI at Billingham and to date have all 12,000 abstracts from *WRC Information* stored in the data base. This represents a carefully selected base of highly relevant material on which to draw for enquiry answering and literature searching.

From the beginning of 1977, records of all library accessions and of technical enquiries received have been input to the data base, together with growing collections of material received by exchange with other organizations. This facility for exchange of machine-readable information between organizations with common interests represents a rapidly growing facet of today's information scene, particularly on the international front and in fields where competition has little relevance but dissemination of information is of prime importance, and the Centre is negotiating with equivalent organizations in North America to make further exchange agreements. Several of the Research Associations have been using ASSASSIN for home time and apart from the divisions of ICI, the next largest group within the ASSASSIN Users Club consists of RAs. A consequence of this has been discussions with the Space Documentation Service in Frascati to market an ASSASSIN/RAs data base and it is hoped that the file will be put up on-line for access via Dialtech during 1978.

Once a data base had been established, the Centre could begin to offer to members and staff, sophisticated literature searching and SDI services. At present, the Technical Information Section is running 60 SDI profiles for WRC staff and 95 for members, with the numbers increasing rapidly as users become aware of the services available to them. As the data base grows, the number of literature searches carried out is increasing and the retrospective search service is established as a matter of course for literature searching. It is planned to market these information services on a commercial basis to non-members, as far as staffing allows. Promotion of all these services to members has progressed steadily, taking care not to over-publicize at first and run the risk of great numbers of requests for services being unfulfilled through lack of staff capacity.

With the availability of Mark V ASSASSIN during 1978, the Articulated Subject Index package will be used to produce printed indexes to *WRC Information* and it is planned to publish and sell the Thesaurus of terms in microfiche or as COM film. Copies will be distributed to all the Regional Water Authority libraries and KWOC indexes to sections of the data base, for example library accessions, will be produced and distributed. Work is continuing with the water authorities towards a water industry union catalogue based on WRC ASSASSIN.

The Centre complements its carefully prepared and specialized data base by making full use of the commercially available services such as Lockheed DIALOG, SDS-RECON and BLAISE, and on-line searching is an essential part of the resources available to WRC information officers.

Management—financial budgeting

In addition to salaries the main elements of the section's budget are the publication of *WRC Information* (offset by sales), library material and computerized storage and retrieval of information. The latter two are services largely dependent on user demand and the budget is calculatd by unit cost of a loan, literature search, current awareness profile, etc. To some extent the amount of money available for these services can be varied to meet the user demand. Supplementary income is derived from charging non-members for photocopies of articles. There is, however, no attempt to run the Technical Information Section, or the Member Services Division on a self-supporting basis because members, especially the water authorities, have included in their subscription an allocation for the provision of full membership services without extra charge.

The Technical Information Manager prepares an annual draft budget in close liaison with all staff involved and this is submitted through the division manager for final approval by the Management Committee and the Council. Control of expenditure is delegated to the librarians and information officers where appropriate, with overall control for the Section exercised by the Technical Information Manager.

Staffing

In spite of a steady increase in the numbers of members requesting 'Member Services' and a rapid increase in the use made of and services offered by the Technical Information Section, it has not yet been necessary to increase the staff complement. Growth of literature search and current awareness services have largely been possible due to successful exploitation of ASSASSIN and the commercially available on-line searching facilities. Increasing use of mechanized methods, centralization of key operations and continuing involvement of the research staff has allowed a steady increase in the number of abstracts published in *WRC Information*, while still maintaining its high quality, and at the same time the generation of computer files of additional relevant information.

Special functions of the information manager

The Technical Information Section is encouraged to participate in events such as conferences, exhibitions, open days and regional meetings, which afford an excellent opportunity for the information staff to meet the members and learn their requirements at first hand. The Section is involved in activities concerned with mailing operations to members, translation services, visitors to the laboratories, maintaining a notice board of current press cuttings and liaison with overseas organizations. This latter activity is particularly important because many institutes which are not eligible for membership liaise with WRC through mutual exchange agreements of information. These exchanges have the immediate effect of improving the coverage of *WRC Information* and the libraries and tend, in the longer term, to lead to improved liaison on research projects and the organization of joint conferences and seminars.

Performance monitoring and training

The Centre operates a formal system of annual job appraisals giving staff the opportunity to express problems, complaints and ideas as well as receiving an assessment of their performance over the previous year and discussing career prospects. Within the Technical Information Section considerable emphasis is placed on establishing strengths and weaknesses and on training programmes to build on these strengths and alleviate weaknesses. Staff are encouraged to attend seminars, short courses and conferences not only on library and information science, but on technical subjects pertaining to the water industry. Both laboratories run divisional seminars regularly at which information staff attend. At present two of the enquiry officers are attending a part-time course leading to MSc qualifications in information science.

Acknowledgements

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Library and information services of the Marine Biological Association of the United Kingdom

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Readers of the current professional literature could be forgiven if they assumed that most library and information operations and services were computerized, and that only mechanized systems were able to cope with present-day requirements. Perhaps it is right that the literature should concentrate on this rapidly changing and developing subject, but most of the library and information services of scientific research institutions known to the author—which include centres of excellence with worldwide reputations—are non-mechanized. There are no reliable guidelines as to when it is economic, practical or opportune to switch to mechanized systems, and there are many variable factors to consider. However 'non-mechanized' does not equate with 'old-fashioned', and the present economic climate, with its limits on expenditure and ceilings on staff numbers, makes it likely that manual methods will be employed for many years to come. The following is a description of a non-mechanized service, catering for the needs of a relatively small local user population, and also providing and offering a variety of services to outside users.

Introduction

THE MARINE BIOLOGICAL ASSOCIATION of the United Kingdom (MBA) was founded in 1884 on the initiative of leading scientists of the day, and the Plymouth Laboratory opened in 1888. The main support for the work of the Laboratory today comes from government funds, and since 1965 it has been grant-aided through the Natural Environment Research Council (NERC). Laboratory staff totals some 125, and in general Civil Service conditions of employment and salaries apply. The major research interests of the staff are concerned with biological, chemical and physical aspects of the productivity of the western English Channel and its approaches, and with the biology, distribution and taxonomy of individual species and communities of marine and estuarine animals and plants. Fish and squid provide a large part of the experimental material required by staff and visitors for physiological and biochemical studies of fundamental biological processes. Each year over 100 visiting scientists from UK and overseas research institutions and universities are provided with laboratory space, facilities and services. The Laboratory provides training facilities and teaching courses for university students, and maintains a public aquarium which attracts some 100,000 visitors annually.

The Library contains one of the world's major reference collections in marine biology, oceanography, fisheries and related subjects. Historical circumstances and other factors such as its geographical isolation from other relevant academic

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libraries, necessitating a high degree of self-sufficiency, have led to this development. Over the years a comprehensive acquisitions policy has been pursued, backed up by exchange agreements and the establishment of contacts with marine research institutions, government departments and universities in most parts of the world. Substantial efforts have gone into the development and maintenance of library catalogues and indexes, bearing in mind the needs of the users and the research areas covered by the Laboratory. The Library occupies a block of three floors, and a new extension, completed in 1975, brought the total floor area to over 8,000 square feet. Nine staff are employed on library and information activities. There are 12,500 books, 37,000 bound volumes of periodicals and over 60,000 pamphlets and reprints held in stock, and some 1,450 current periodical and serial titles are received. There is an extensive collection of expedition reports, together with a rare books section, archives, colour slides, films, charts, and microform material.

Aims, users and finance

The main objectives of the Library are:

(i) to provide a comprehensive reference facility in the field of marine biology and related sciences. This means that it should be able to provide, within the establishment, publications for consultation on demand.

(ii) To provide a current awareness service, on a personal notification basis, for MBA scientists, visting workers and some technical and support staff.

(iii) To provide an information retrieval service to answer scientific and technical enquiries and carry out literature searches as required.

Because of its comprehensive coverage the Library is particularly suitable as a base for literature searching, gathering and analysis, and for specialized information activities designed to exploit specific areas of the collection and provide services to external users.

The Marine Pollution Information Centre, established in 1970, has been particularly successful and cost-effective. In addition the Library is the UK focal point and input centre for the international Aquatic Sciences and Fisheries Information System (ASFIS); it is a contractor providing data and testing formats for the Environmental Chemicals Data and Information Network of the Commission of the European Communities (ECDIN); it undertakes bibliographic work on contract for outside organizations and it acts as a publisher. The main users are the Laboratory's research scientists and their assistants, visiting workers, and members of the Association. It is also used regularly by scientists and staff of the nearby newly established Institute for Marine Environmental Research, and by staff and students, subject to restrictions, of Plymouth Polytechnic; it is not open to the general public.

The staff consists of a chartered librarian, two science graduates with information science qualifications and experience, a science graduate/abstractor, a PhD on short term contract and four library assistants (clerical officers); additional staff are employed on a contract or casual basis, as required for specific projects or contracts. Because the Library has a restricted number of users, and because most are well known to the library staff, it is possible to operate with the minimum of rules and regulations and with an informal atmosphere. The Library is a Laboratory service which also has income from contracts and projects; its head reports direct to the MBA Director and there is no library committee. About £18,000 a year (1977 figures) is spent on periodical subscriptions, books, British Library forms and special stationery. Serial publications worth more than £10,000 annually are received from organizations in many parts of the world under exchange agreements for *Journal of the Marine Biological Association of the United Kingdom*. Financial restrictions and the fall in the value of the pound in recent years have made it necessary to cancel a number of periodical subscriptions and to cut back on book purchases, increasing the reliance on British Library and diluting in-house reference facilities.

Services and current work

Acquisitions

The bulk of the Library intake is in serial publications. Some 1,450 different current titles are taken of periodicals, expedition reports, 'semi-published' and other reports issued in series, including fugitive literature of limited circulation. About a third of this material is purchased; a third comes in exchange for the MBA *Journal* and the remaining third is received free of charge. Books and monographs relevant to the subject scope of the Library or the research interests of the Laboratory staff are purchased and a number are received as review copies. About 2,000 pamphlets and reprints are added each year. Current awareness and other publications are scanned to identify papers published in periodicals not taken by the Library but relevant to its subject interests and requests for copies are sent to authors. Xerox copies of papers in journals borrowed from other libraries on behalf of scientific staff are retained, and lists of available papers from other institutions are checked for relevance.

Cataloguing and indexing

All incoming material is scanned. First, to identify marine science papers for cataloguing and indexing; secondly, to determine which of those papers are relevant to the subject interests of staff and visitors for inclusion in the current awareness service and thirdly, for relevant advertisements and book reviews, news of publications of potential interest, and for news items concerning other marine science institutions and laboratories. Marine science papers within a defined subject scope receive entries on cards for the main author catalogue; marine biology papers are indexed for the current (latest five years) subject index of marine biology and additional comprehensive indexes are maintained on marine pollution, British waters, the South-west and UK estuaries. A Minigraph card duplicating machine is used to produce multiple copies of cards for the catalogues, indexes and current awareness service. Including marine pollution publications, 11,000–12,000 papers annually are catalogued. The principle strongly applied is that publications are scanned once only, and only one entry per paper is typed, from which multiple copies can be produced on cards for a variety of purposes. Standardized forms of entry have been devised, and a commonsense approach is applied and encouraged. There is no time to indulge in elaborate collation, or in the philosophies and mystiques which can be built up around classification, cataloguing and indexing.

Current awareness service

Detailed subject interest profiles are maintained, and some fifty Laboratory staff and longer-term visiting workers are notified of all papers received which are likely to be of interest to them. The service is on cards which are distributed weekly and which are identical to the catalogue cards. They give details of: shelf location, author(s), title and journal or other citation; titles in foreign languages are translated, and brief annotations regarding subject matter are added when not apparent from titles. The service is highly regarded by its recipients, and has been studied in detail by librarianship researchers concerned with manual current awareness methods. Journals are not circulated, but latest issues are displayed to encourage regular browsing. There has never been any demand for abstracts to be prepared, titles plus annotations proving sufficient for the recipient of the service to decide whether the paper is worth checking. Because the customers are known personally to the information scientist, publications of particular or vital interest can be passed on immediately upon receipt. The service is based on the intake of the Library and, to cater for scientists with interests which lie outside the scope of the Library or which are covered inadequately, a number of special information bulletins are purchased. These cover enzyme regulation, nerve cell biology, neurophysiology and electrolyte solutions. Before the scheme became too expensive, a number of staff scientists received a regular service based on computer profiles run against *Biological Abstracts* tapes.

Loans

Records are maintained to show both the locations of particular items and the various titles out on loan to individual borrowers. Publications are recovered when required by other readers and are not normally available for outside loan or for home reading. A do-it-yourself issue and return system is operated, and since there is no period of loan, with consequently no overdue notices to send out, clerical routines are reduced to the minimum.

Inter-library loans

About 1,000 publications a year are borrowed for staff and visiting workers, mainly from the British Library Lending Division, but also from other UK and overseas libraries. About 700 requests annually are received from other libraries for the loan or provision of photocopies of specific papers held in the Library or the Marine Pollution Information Centre.

Enquiries

Requests for information and subject enquiries are received from the whole range of users, and from outside by post and by telephone. Literature searching is undertaken and assistance is given as required. In general, Laboratory staff know their way around the Library, and demand less assistance than visitors unfamiliar with the literature. Letters and telephone requests come from a wide variety of enquirers, varying from research scientists and industrialists to students and schoolchildren. Some can be answered by the provision of a photocopy of a paper or a previously prepared reading list; others need an appreciable amount of staff time. Bibliographic projects are undertaken for outside users and organizations on a payment or 'mini-contract' basis.

Stock management

Because of the cumulative value of research in the biological sciences, and the value of the older literature and the policy of maintaining a comprehensive reference collection, very few periodicals are discarded from the Library, and the practice over the years has been to bind issues of periodicals into volumes. About 400 volumes need to be bound annually, although increasing costs may force a modification of this policy.

Marine Pollution Information Service

Following the Torrey Canyon disaster in 1967, the MBA diverted its entire resources to studying the consequences of the oil spill, and the Library made an extensive search of the literature for references on marine oil pollution. It was discovered that the Library already contained most of the relevant papers, although they were scattered throughout a wide variety of publications. A special collection of documents was started, and scientists and technologists began to send requests for information. In 1970 NERC agreed to the establishment of the Marine Pollution Information Centre. It covers the field of marine and estuarine pollution, including the detection, analysis and removal of pollutants; pollution levels in sea-water, sediments and organisms, and the biological effects of pollution. All incoming publications are checked for relevance and, in addition, the Centre obtains copies of papers that lie outside the scope of the Library. The Centre now contains the most comprehensive collection in the world on the subject, some 16,000 papers being held currently indexed and available for consultation. Catalogue and index cards are prepared as part of the general library operation, and individual current awareness services are provided to MBA scientists and a number of outside users. Normal information, enquiry and referral services are provided, and a monthly current awareness bulletin is published, together with specialized bibliographies. An optical coincidence card system was started, but abandoned in almost virgin state due to lack of staff time. A computerized file, indexed in great depth, would be ideal but there are no resources to permit retrospective indexing and processing.

Aquatic Sciences and Fisheries Information System

The Aquatic Sciences and Fisheries Information System (ASFIS) is an international information system for the science and technology of marine and freshwater environments. The system is co-ordinated by the Food and Agriculture Organization of the United Nations (FAO) and the Intergovernmental Oceanographic Commission of Unesco (IOC), with the collaboration of national partners in Canada, France, Germany, Mexico, Portugal, USSR, UK, USA and, in the near future, Japan. Substantial financial support is being provided by the

United Nations Environment Programme (UNEP). The main product is the abstracting journal *Aquatic Sciences and Fisheries Abstracts* (ASFA) which is published monthly by Information Retrieval Ltd. London. Other products of ASFIS include monthly current awareness publications reproducing contents pages of marine and freshwater sciences journals; computerized registers of experts, institutions and projects and systems tools including the ASFIS Thesaurus and the Geographic Authority List. The aim is to develop a computer-orientated service to cover the collective scope of countries and United Nations agencies with interests in and responsibilities for the aquatic environment. A global network of ASFIS centres and agencies will eventually provide local points of contact through which users will have easy access to the data base, and attention is being given to the problems of document delivery, particularly for the less-developed countries. An experimental tape covering 1975 citations and indexes is available for on-line searching on Lockheed DIALOG. Machine readable citations with indexing terms will shortly be available covering the period January 1975 to December 1977 and, from 1978, complete files including abstracts will be available. Tapes will be in the International Standard Organization's format for exchange of bibliographic information (ISO 2709), and will be accessible through DIALOG and, it is hoped, eventually through EURONET. NERC is the UK partner, with the MBA Library as the UK focal point and input centre. Some 1,000 citations and abstracts a year are processed at the MBA for ASFA. Coverage is mainly of the marine pollution literature, but is gradually being extended to include non-conventional and report literature on the marine sciences produced in the UK. Other work concerned with the development of the system and its promotion, its tools, and the improvement of its scope is undertaken at the MBA.

Publications and contract work

Marine Pollution Research Titles is published monthly, listing papers currently received in the Marine Pollution Information Centre. Each issue contains some 180 entries arranged in thirteen subject groups. Fifty copies are distributed free and a further 150 are sold on subscription to organizations and individuals in many parts of the world. A comprehensive *Bibliography on Marine and Estuarine Oil Pollution* (1971), with two *Supplements* (1975 and 1978) have constituted, by our standards, a best seller, though a similar bibliography, on pesticide pollution, has perhaps not sold as well as anticipated. The first two issues of *Estuaries of the British Isles: a Bibliography of Recent Scientific Papers* were well received when they appeared in January 1977 and January 1978 and annual issues, possibly expanded to include UK coastal waters papers, are to be published. Typing and printing are undertaken by a local agency whose owner is accustomed to handling bibliographic references since she previously worked in a library. Prices are kept as low as possible in order to encourage the widest distribution. Taking a lesson from many of the bibliographies, directories and guides to the literature issued currently by information units and entrepreneurs, which turn out to be inadequate, inaccurate, misleading and generally of poor quality, great attention is paid to making the bibliographies as comprehensive as possible and the citations accurate. Promotional work, sales and subscription records are handled by library staff and, although this side of publishing is interesting, it takes up a fair amount of staff time. The main catalogues of the library, and the marine pollution subject index, have recently been photographed and published in book form in sixteen volumes by G. K. Hall and Co. of Boston, Massachusetts. Lists and abstracts of papers recording work carried out at Plymouth are prepared for publication in *Journal of the Marine Biological Association of the United Kingdom,* which is edited at the MBA and published by Cambridge University Press. Contracts involving substantial amounts of staff time in the preparation of specialized bibliographies were received during 1977/1978 from the Intergovernmental Oceanographic Commission of Unesco, FAO, the National Water Council and the Australian Institute of Marine Science. Similar but smaller projects were undertaken on a payment basis for outside organizations and firms of consultants.

Environmental data

The Environmental Chemicals Data and Information Network of the Commission of the European Communities (ECDIN) is a system for the storage, retrieval and manipulation of data on environmental chemicals; it is not directly concerned with the retrieval of bibliographic references. The system is in its 'post pilot/pre-operational' stage, and data in machine-readable form is held at the EURATOM Joint Research Centre, Ispra, Italy. In the first phase input has been limited to a maximum of 5,000 compounds, but in the longer term it is planned to include all chemical elements as well as organic and inorganic compounds which may be present in quantities capable of harming man, animals, plants and the environment. Information and data on the marine environment is included in the system, and the MBA library has a contract to assemble data on the fate and effects of certain chemical compounds in seas and estuaries, and to design, test and advise on various input formats. No difficulties have been encountered in finding and extracting the data from the literature, but environmental information is not easy to standardize and tabulate and presents interesting problems. Collaboration along similar lines is being developed with the United Nations Environment Programme International Register of Potentially Toxic Chemicals, in Geneva.

Use of computers

An author and subject (keyword) index to papers and abstracts published in the *Journal* of the MBA, 1950–70, using input prepared by the library, has been produced by London University Computing Services Ltd. Methods of publishing the index are being examined. Work on a marine science citation analysis, based on papers published in recent years in our *Journal* is carried out spasmodically (and manually) by visiting students of librarianship. From 1971 to 1975 the library took part in the *BA*-Previews (*Biological Abstracts*) experiment. Search profiles defining the subject interests of MBA scientists were prepared and run regularly against the computer tapes for current awareness. Originally nine profiles were run, but through dissatisfaction with the results and as pricing was introduced, this dropped to four. Charges proposed for 1975 (over £200 for one profile for one year) caused the MBA to lose interest. Between 1971 and 1973 subject profiles for marine pollution were run on the UKCIS, ASCA and MEDLARS systems. None of the services produced appreciable numbers of papers which had not already been acquired or noted. The marine sciences are poorly served by the big computerized bibliographic data bases and, with the exception of ASFA, none of them cover more than 40 per cent of the marine sciences literature. In order to gain experience in on-line searching, and to have access to fringe subjects, Lockheed DIALOG will be used via MBA terminals from 1978. In co-operation with nine major marine and freshwater science libraries in the UK, a computerized list of periodical and serial holdings has been produced. The tape lists all holdings, with locations, and is updated regularly; individual libraries are periodically provided with listings of their own holdings. All input for ASFIS is submitted in the required format for computer processing. As on-line searching becomes more economic, and as data bases (particularly ASFIS) become more comprehensive in their coverage, it is anticipated that on-line searching will become a more everyday routine. Because of the time lag between the publication of a scientific paper and its inclusion in a computerized data base, it is unlikely that computerized current awareness services would be welcomed by MBA scientists, except for back-up purposes or searches of fringe subjects. This time lag, usually of between six and twelve months, sometimes more, is glossed over by proponents and operators of mechanized SDI, but the fact remains that to tell a scientist of the existence of a paper twelve months after it has been published and received in the Library, and to describe this as 'current awareness' brings no credit to library and information staff.

Co-operation and collaboration

An informal information network has been developed over the past ten years between marine and aquatic sciences libraries in the UK, principally within NERC, the Ministry of Agriculture, Fisheries and Food (MAFF), and the Department of Agriculture and Fisheries for Scotland. Regular meetings are held, and the main benefits are in inter-library borrowing, principally of scarce and obscure publications; having access to specialized indexes, information sources, and expertise and in discussing mutual problems. One of the group's major collaborative projects has been the preparation of a computerized union list of periodical and serial holdings. Through the ASFIS/ASFA project similar working relationships and a network of personal contacts have been built up with international organizations and with major marine science libraries overseas. On a purely local level, contact is maintained with polytechnic, public, academic and special libraries in the Plymouth area.

Conclusion

No drastic changes are planned for the foreseeable future, though the Library will adapt to cater for new requirements and take advantage of developments. It is expected that as the coverage of ASFIS becomes more comprehensive, reliable and timely, the availability of the data base and of the printed abstract journal ASFA will enable the library to reduce the amount of internal cataloguing and indexing undertaken. Space and storage problems will be experienced in about five years' time, and a policy of removing runs of lesser-used publications will be followed. Some material will be kept on microfilm, but unless there is a publishing revolution the understandable dislike and hostility of users towards this medium, and the expense of producing hard copy, makes it unlikely that microform holdings will reach any significant level. National and international links and co-operative projects will continue to be encouraged, and it is hoped and anticipated that the Library's comparatively new venture into data extraction, formatting and analysis can be further developed and exploited.

A basic guide to conference organizing

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Paper presented at an Aslib Evening Meeting, Aslib, 24th May 1978

Introduction

ALMOST ANYONE CAN ORGANIZE a conference but to do it well is difficult because of the intractable material involved.

All conferences have much in common—a programme, speakers, delegates—but the institutional conference, such as Aslib is involved in, has particular characteristics that can be identified broadly as:

(i) an audience that must be attracted by the programme, hence uncertainty of numbers,
(ii) a concern about costs, which can range from hundreds or even thousands of pounds in a big national or international conference, to financial stringency in a small or shoestring affair.

The aim of this paper is to help those who from time to time organize conferences and to give an idea of the factors involved to those who do not indulge in this hazardous but fascinating activity. I can best start by charting the main phases in the organization of a conference (Figure 1).

DECISION TO HOLD CONFERENCE
Place   Programme   Budget.
Publicity
Documentation
Contact with the Conference Centre
THE CONFERENCE

FIG. 1

Conference theme

No theme, no conference—the decision to hold a conference is inextricably bound up with being able to identify a theme and develop a programme from it. Even with annual conferences, which are in a sense a ritual get-together of an association, the importance of the programme cannot be underrated. The best source of a programme is from a few articulate people, deeply involved in the subject, who meet as a committee and from whose discussions the outlines of a programme should emerge. A body of 'ideas men' may be quite informal and one meeting may be enough or faced with the inevitability of a conference, like Aslib's Annual Conference, it may be formally constituted and

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meet three or four times. In the case of EURIM, there may be two committees, the Committee of Representatives of Sponsoring Organizations who decide in principle that the conference should be held, in what country, what the theme should be and a Programme Committee, responsible for developing the programme and selecting papers received in response to a call. In any case, from this initial committee should emerge not just vague ideas about a programme but concrete suggestions for session headings, topics and possible speakers. This Programme Committee may also have the task of deciding in principle the type of conference, its duration and level, whether residential or not, the hoped-for size and type of audience it might attract and the date. Armed with these decisions the conference organizer can go ahead and put them into effect.

Timescale

A word about the timescale. I do not think one can be too arbitrary here. My general rule for a big conference like the Aslib Annual Conference or EURIM is that the main publicity effort with registration form should go out six months before the event and for a smaller one-day event not less than two months in advance. A small one-day conference can be set up very quickly if there are no problems; a big conference takes a long time—a year or eighteen months. A year's notice is needed to secure the accommodation of choice, the location desired and to avoid clashing with rival interests.

The main tasks of setting up a conference—choice of location, development of programme and the budget—happen more or less simultaneously.

One-day conferences

The one-day event can be dealt with fairly briefly. First, the choice of location. A lecture hall is required that will take the maximum number of delegates expected to attend. Look for pleasant conditions, comfortable seating, good acoustics, lighting and ventilation, an adequate platform for speakers, a good projection and public address system—it is a great advantage if these last facilities are available in the hall—bringing them in from outside can be far less satisfactory. In addition to the hall itself a foyer is needed for the reception and registration of delegates, adjoining which should be a cloakroom and a sufficiency of toilets. Not absolutely essential but a great asset is the availability of call boxes and a cash bar. For registering delegates a table is required at which two or more people can be seated with space to lay out their badges, attendance lists, spare programmes and any other documentation. Catering will also have to be considered. If the foyer is large enough, it may be possible to serve morning coffee and afternoon tea and even a buffet lunch there. If not, a large room adjoining the lecture theatre will be necessary. If the conference accommodation can provide catering this will greatly simplify matters and then the hire of the hall will probably be calculated on a *per capita* basis on the number of delegates and depend mainly on the cost of the lunch. However, if catering in-house is not available it may do very well to employ a good outside caterer. The best halls are custom-built—one that springs to mind is the CEGB lecture theatre at Sudbury House—where there is no catering. In hotels, where of course the only problem about catering is the cost, it may be necessary to look much more carefully at the lecture accommodation.

Two or three day conferences

When embarking on a two or three day conference, the question will immediately arise whether or not it should be residential. The arguments for residence are very strong where it is an association's or group's periodic get together, or when you have a very tight-packed and controversial programme and are really bringing people together to study a subject hard and come out with some sort of a consensus or plan of action. When the conference is a bit of a 'jolly' and the wife or husband comes much is to be said for encouraging delegates to make their own hotel arrangements, preferably through some booking agency or travel agent with whom arrangements have been made. Other considerations may influence your decision in this matter, as they did in the matter of the EURIM conferences, *e.g.* the workload and financial commitment that your organization is able to shoulder.

Accommodation

Having decided on a residential conference, the choice lies broadly between hotel and university accommodation. Anyone who has given even a passing thought to conferences knows what big business it has become and that hotels and universities are vying with each other in offering conference packages. The skill here lies in making a choice between what can be a bewildering range of alternatives.

As is known, Aslib on the whole favours the university conference and my experience of any other is very slight. The arguments in favour of the university are first, and very obviously, price; the lecture accommodation is often better, with a wider range of rooms of varying sizes and with a better provision of projection and such like facilities. Larger numbers can often be accommodated under one roof or at least on one campus. But, of course, even the best equipped, single study bedroom is spartan compared to a good hotel bedroom with bath, telephone and probably TV.

The basic requirements for a conference like the Aslib Annual Conference, EURIM or FID, whether residential or not, are a really good auditorium, a large foyer or foyers and bars, space for the serving of teas and coffees to large numbers in a short time and, if an exhibition is contemplated, a large square-footage of space so close to the auditorium that in the breaks between sessions delegates are virtually bound to go there. This kind of conference accommodation is to be found in custom-built conference centres, universities and, generally, high grade and consequently high-priced hotels, with a room rate that immediately makes the conference very expensive for all those taking part. It is this that accounts for my choice of universities for annual conferences and of conference centres for EURIM.

Although the accommodation offered by universities is pretty standard, there are variations that can make all the difference. The points to look for—you cannot generally achieve all of them all together and have to go for the best possible mix—are compactness—Lancaster was a good example of this, Exeter the reverse; a good standard of bedroom—*i.e.* washbasin with hot and cold water and points for razors in all of them (and I feel the beds!); bathrooms in preference to or as well as showers; spacious and pleasant lounges and sufficient bars, the kind of lecture and ancillary accommodation I have already described and good catering. The latter, as one does not have the chance to experience it, has to some extent to be taken on trust. Everyone prefers waitress service, but I fear it is on the way out; look for a dining room that can seat the whole conference, for ways of streaming the self-service to minimize queues. On top of this, and often a decisive factor, is the feel of the place, the assessment you can make of the skill and dedication of the conference manager—or whatever he is described as, sometimes this is significant—and of his staff. However good the package, there will be snags and the weak link which can be found also in hotels, often proves to be service—just not enough, unimaginative and inflexible. 'Ask your friendly hotel manager' the advertisements say, but he may refuse to handle the room bookings and confirmations for a conference at which he is going to sell, for a pretty steep price, 200 or 300 bednights for two or three nights.

Speakers

Turn now to the programme which, as I have said, is a co-operative effort enriched by the advice and experience of a range of advisers. 'Choose speakers who are not only expert in their subject', one is told, 'but who also know how to present it intelligibly and with style, who understand the value of aids to presentation, who can be heard'. Yes, of course, but these qualities can only be established on the advice and say-so of advisers or on one's own experience. One important point must be borne in mind. The speakers invited are not, as a rule, TV personalities, trained orators or even politicians; they are scientists, librarians, computer specialists—that is where their professional expertise lies. As presenting papers is quite an important part of many people's professional activity, it would repay them—as many do—to give a good deal of thought to this matter of presentation.

Conference sessions

First, the timing of the sessions is important. Do not over-crowd—papers more often overrun than fall short. If there is to be discussion, allow specified time for this (and incidentally, do not underrate how long to allow for tea and coffee breaks). When inviting a speaker, state very clearly how long he is expected to speak and describe as fully as possible what you want him to talk about. Give him as complete a picture as you can of the overall programme in which he will take part, the names and topics of the other speakers as far as projected or established, the range and level of audience and its likely size—all these will help him to identify the scope of his own contribution. This initial letter of invitation should also, of course, state if you are offering a fee, the arrangements for accommodation and travel expenses and whether you will want a preprint or a text for publication. Having secured the speakers, you will of course keep in touch by sending copies of the programme when printed, with information about general arrangements, and in particular with any advice you feel able to give about presentation. The best you probably can do here is to emphasize how much good visual aids enhance a paper and by telling him what is available and most likely to be effective in your conference hall, *e.g.* the size of screen, the throw, the optimum size for figures on a slide and help him to produce good ones. The organization of the sessions is also vital and should be thought of at this stage.

Chairman's role

What is the chairman's role? It is to introduce the speakers, with a few very brief personal details, prevent overruning, stimulate (if necessary) and control the discussion (when session chairmen are invited they should be told this). Discussion sessions, particularly, repay careful preparation—everyone wants them, but they are generally criticized and are in fact not easy to organize well. Consider whether to have prepared questions submitted in advance, 'planted' questions that appear spontaneous, or to leave it to the initiative of the audience on the day. Whatever you decide, brief the speakers fully about it, though I always suspect such notes are not read very carefully. Nothing can replace the meeting of speakers and session chairmen at the beginning of the conference itself, preferably in the conference hall with the projection facilities and public address system and projectionist *in situ* also. It is extraordinary how difficult it seems to be to fit in this sort of 'dress rehearsal', but its value cannot be overstated.

At this stage of programme consolidation a number of points need to be established, such as whether your conference will consist of plenary sessions—*i.e.* using one main hall—or parallel sessions, whether there will be study groups and working parties requiring committee rooms, whether there will be an exhibition, the social programme, reception, banquet, etc. and a visits programme. Some sort of social programme is essential, adding greatly to everyone's enjoyment and helping people to get to know each other—one of the great objects of the conference. The form of the social programme, drinks reception, banquet, buffet lunch, discotheque—will depend on all sorts of circumstances, not least what can be afforded. A visits programme may be a 'frill'—a tourist jaunt in an attractive place—or a supplement to the professional side of the programme. In either case, transport is likely to be involved and must be organized and paid for. Some of these details—social programme, extra sessions, visits—are liable to develop later, but the earlier they can be established the better prepared you will be for the next, all important step—the conference budget.

Budget

I can give no sure-fire formula for costing. The theory—add up all possible expenses and divide by the figure below which you feel sure your numbers will not fall, to give the break-even point and the basis for your conference fee. It is simple (see Table 1). Incidentally, the figures are purely fictitious and the example taken is a residential conference which is interesting and complicated.

ITEM	£
Overheads	2,000
Printing and publicity	500
Hire of halls and facilities	400
Accommodation—e.g. 20 for 3 nights at £40 per head	800
Travel	500
Entertainment	200
Visits and transport	500
TOTAL	4,800

TABLE 1: *Draft budget*

These are the basic costs, to which you are committed whether your attendance is 40 or 400. You decide to break even at 200—£24, to which you must add the per head cost of accommodation and catering—and do not forget to add an element for, *e.g.* reception or banquet to give a fee on this figuring of £64.

Simple—but not quite so simple when looked at a second time. Besides costs there are two other factors in your equation. Numbers—it is difficult to estimate how many delegates there will be. Even a well-established, annual affair can fluctuate quite a bit—not far off a hundred is quite possible—and makes a very great financial difference. For a one-off event you guess and trust to the quality and timeliness of your programme and the rightness of your decision about the other factor—the price that the market will bear. Here again, with an established event there is a precedent to go by—stick to this as closely as possible and if it is necessary to increase, keep it, if possible, below the current rate of inflation. For a one-off event, compare prices with competitors and test the feel of the market by conversation and observation. Before reaching a decision you will have gone back again and again to the only area that is potentially determinable—your costs. These have a devastating tendency to grow. It would be nice to take the figure £64 and double it, but that unfortunately would be unlikely to give you the pared down, value-for-money fee that you will need to attract delegates. So you need to go back to your figures and study them very carefully to make sure that they are not really 'guesstimates', that in fact the prices and estimates are firm, that the expenses will not 'run away'.

Take *overheads*. The conference may be ancillary to your ordinary tasks—perhaps you can 'lose' them altogether or you may have an established figure that has to be earned by this and any other conference you may organize during the year. If you were setting up a conference department it would be necessary to think very hard about this—salaries, office services, accommodation, equipment. In any case, check whether your overheads cover the telephone and postage as this affects the rest of the budget a good deal.

Printing. You will need to think about your publicity material—a programme and registration form, a conference handbook, perhaps preprints, invitations for functions, a menu. What sort of numbers are involved? If there is no precedent to go by, ask your printer for an estimate. Apart from mailing shots, publicity may include advertising. This also has a price.

In these days of inflation it is not always easy to get firm quotations for conference services. By persistence and postponing the final budget and the decision about the fee, to as late as possible—until the printing of the main programme and registration form—you ought to be able to arrive at a figure for the hire of lecture accommodation, for catering and residence and for the reception that it is fairly certain will not be exceeded. Watch very carefully for extras. You know what the main auditorium costs, but what about those study sessions someone thinks up at the last moment for which you have to hire additional rooms? What about the early morning tea, the small informal party your Director suddenly thinks he would like to throw, the discotheque suggested by the youngest member of the Committee or the exhibition set up at the last minute (but exhibitions ought to pay for themselves). It is necessary to know about these things when budgeting, to be sure they have been added in. Some fellow staff will need to come to the conference and they will each cost as much as a delegate—their residence and their travel as well. Speakers' expenses can be a very big item these days and it is not easy to estimate them accurately. I will not discuss the pros and cons of offering a fee, as with institutional conferences this does not arise very often, but in the matter of expenses, as a general principle, I believe no speaker should be personally out of pocket after giving a paper. Tape recording for the sessions, closed circuit television for your overflow, signposting, flowers all add to the expense. Some of the skill—bred of experience and luck—lies in foreseeing the eventualities and calculating their cost. Then, with these revised figures, add up the column of fixed costs again, do a sum of division by delegate numbers and if you do not come out with a fee that seems reasonably acceptable some hard thinking has to be done.

So, I end where I started on the budget—with no easy answer. From the first conception of the conference, have the costing in mind—what level, what numbers, what kind of fee? All these considerations are absolutely basic to the whole form and structure of the conference. Go through the figures again and again, insist on firm estimates, delay your final costing as late as you can—and pray that the crowds will come!

Publicity

To this end, of course, the publicity campaign is aimed. This, too, should start at the earliest possible moment—an announcement of date, place and theme in the professional literature, possibly press release and if it is a large event and time permits, an insertion in the various publications listing forthcoming conferences—such as Aslib's own list. There may be a call for papers. As a means of setting up a programme I am not very keen on this but it is an excellent way of giving the conference advance publicity. For publicity a leaflet is needed setting out the main heads of the programme, perhaps the names of a few invited speakers—if any have been secured, conditions for submitting papers etc. and the essential details of date and place.

The programme and registration form—timed for about six months in advance for a big conference, not less than two for a smaller one—is the main publicity medium and should be as attractive in appearance as skill and finances can make it. It should contain all the selling points of the conference—the session heads, titles of papers and names of speakers, some indication of how the theme will be handled, if discussion sessions or parallel sessions are envisaged and so forth. If there is an exhibition this should be stated, possibly with an additional leaflet with information and directions for booking space if available. If there is a visits programme this is an added attraction and should be mentioned, as should any social arrangements. If the conference is a residential one, details of accommodation and domestic arrangements, how to book and so forth, must be included. If you have laid on special transport—a charter flight (but think many times about this), this should be mentioned. Bearing in mind the need to keep the leaflet moderate in size, crisp and succinct, remember the more you can say about the programme, the arrangements, and of course the price, the easier it is for delegates to decide to come and the fewer the questions needing an answer. The section on the fee needs to state clearly the rate (there may be differing rates, for members and non-members; there may be a residential and non-residential rate; you may decide to offer a concessionary rate to those paying before a certain date—with a view to encouraging early registration, always balm to the conference organizer, but not very noticeable in its effect on bookings). It is important to state clearly whether VAT is included in the fee or will be a percentage extra and also what the penalty is for cancellation—usually a nominal sum—and after what date the fee cannot be refunded. The application form needs to show name, titles, degrees, appointment, organization and address (Figure 2).

The distribution of publicity should be as widespread as possible. It is very difficult to oversell a conference. A membership organization will have its mailing list of members. If possible persuade other organizations to carry publicity with one of their mailings. The distribution of the programme will

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NAME AND DATE OF CONFERENCE

To: The Conference Organizer
[address]

APPLICATION TO ATTEND

NAME ....

DEGREES ....

POSITION IN ORGANIZATION ....

ORGANIZATION ....

ADDRESS ....

Cheque enclosed or
please send invoice

SIGNATURE .... Date ....

FIG. 2: *Registration form*

obviously be accompanied by a press release and this can be followed up at intervals with paragraphs reporting developments in the programme. It is important to print enough copies of the publicity leaflet—reprints are very expensive, initially the extra two or three thousand are not. It is a good idea to have a second mailing to members, say two months before the conference, if bookings do not seem to be coming in fast enough. The anxiety neurosis that haunts most conference organizers is useful here, spurring one to extra effort which may be superfluous but no one can ever prove that it is!

With the publicity launched and the main lines of the conference laid down and perhaps four or five months to go, it would be tempting to relax but in fact there is plenty to be done. Besides watching and dealing with registrations and keeping the publicity pot boiling, there will be renewed contact with the speakers about presentation, about the abstracts and the texts of their papers (for the conference handbook and possibly preprints) and with the locality. A conference handbook such as Aslib prints for the Annual Conference takes eight weeks to produce—the EURIM one, being shorter, a week or two less. This document will contain very full details about the programme, including probably abstracts of the papers, exact timings of the sessions and full details of the physical arrangements—when to arrive and where, telephone, postal and banking facilities, etc. This should be distributed to all delegates three or four weeks before the conference. In my case, as you know, I always accompany this with an individual letter and if you can spare the time to do this I think it is worth while, as it is a double check on yourself as well. The conference documents should also include any invitations, a map if this is felt to be necessary and a list of those attending. In addition, there may be preprints of the conference papers. This is a considerable extra undertaking. It is facilitated by asking speakers to provide their text in camera-ready form, following a standard layout. Even so, the printing and mailing of these texts perhaps 300–400 is a very formidable undertaking.

It is always advisable to visit the place of the conference shortly before the event and a good time to do so may be at the proof-reading stage of the conference handbook, so that details, *e.g.* which door to arrive at, where buses depart from, the location of the bank and post office, the telephone number, etc. can be rechecked. This visit is also the opportunity to check a number of arrangements which can make a great difference to smooth running on the day. Revise, *e.g.* the general layout and relationship of such facilities as lecture theatre, rooms where receptions are held, dining room and bars. Check on the banquet, if there is one—deal with final details of the menu, who prints it, the toastmaster and top table. If there is an exhibition, double check when access is available. If providing bus transport, discuss the brief with the bus hire company.

The last weeks before the conference will be occupied with lists—and of course late bookings and changes of plan. The numbers will have to be confirmed—and reconfirmed with amendments—for meals and for accommodation to the conference centre. There will be lists of visits, if any. A final list of delegates must be prepared, probably a 'late-night supplement' and a supplement to the programme. Badges must be prepared and alphabetized. This can be done in-house (as at Aslib) or outside, or you may prefer to give delegates blank badges on which to write their own names. Name cards for the speakers and chairmen must be prepared and also directional signs. Hopefully there will be some helpers at the conference and it is necessary to think how best their efforts can be organized and to give them a brief. However much foresight you exercise, the sheer bulk of work during the run up to a conference is very great.

The Conference

The conference organizer needs to arrive at the scene of the conference at least twenty-four hours before it begins and it is helpful to be accompanied by one or two colleagues. One of the disconcerting things that has to be overcome is the sense of strangeness and disorientation one so often suffers on arrival and which affects delegates also and is one of the reasons they often seem so helpless and at a loss. The conference organizer first has to surmount this feeling, then needs to run through all the arrangements with the local staff, set up the conference office, the registration desk or desks with the badges and documentation to be given to arriving delegates, check that directional signs are in place and that the local staff are ready for the arrival of delegates. The placing of the registration desk deserves attention. Obviously, it needs to be near the entrance, unavoidable and so arranged that delegates can pass quickly on to the cloakroom and the sessions. To prevent bottlenecks, it is advisable to break up the alphabet, a–d, e–k, etc. with a helper for each section registering the arrivals. I use the alphabetized badges as a check rather than a list—as the badges must be found and handed out this is quicker. However well organized, 300 or so people arriving in an hour is pretty overwhelming and when delegates come with problems it is almost impossible to prevent a queue forming. When registration is combined with checking a room this is even more difficult. The position of the registration desk then has to be thought of in relation to people arriving with luggage, collecting room keys and being shown to their rooms. I do not think at this point it is possible to avoid some waiting about. In universities it is often quite a little walk to the rooms and there are never enough porters but I believe a hotel also would find it quite taxing to deal with such an influx. The fact is, however, that at an Aslib Annual Conference, for instance, 300 people arrive between 5 p.m. and 7 p.m. and they are all sitting down to dinner by 7 p.m. or very soon after, so though the process can seem rather horrific, it can be done.

If registration does not coincide with checking into rooms, it may well happen that at much the same time a speakers' and chairmens' rehearsal is going on, or more likely still, the arrival of VIPs (your conference chairman, for instance) and the actual process of getting delegates into the auditorium and the conference proceedings launched. These first few hours are the worst, all the problems and crises seem to arise simultaneously and it is here that the care and attention of the advance planning bears fruit—or does not if it was lacking. Once the sessions have got under way, the speakers doing their stuff, the public address system found to be working and the first meal consumed, the proceedings seem to shake down and move forward of their own volition. If the planning has been good, the instructions of local staff clear and understood, the programme, the projection, the catering and all other arrangements should go ahead smoothly. I say should, but remember I mentioned intractable material and nothing can be assumed. Instructions can be misunderstood, forgotten, ignored, speakers can fall down dead, fail to turn up, simply talk for far too long and/or off the point; anything can happen and sometimes does. Your only insurance is to be vigilant all the time.

Conclusions

Can I leave you with one or two random thoughts? It is not possible to do all this alone. If there are colleagues and helpers available, involve them, delegate. For instance, if the sessions are being taped and rapporteured, make someone responsible for organizing that. Someone else might be entirely in charge of the transport arrangements, another responsible for bringing speakers and projectionist together and for securing their texts for publication. As the conference progresses, delegates will need advice about local conditions, times of trains, how to get away. Your conference office needs to offer this kind of service and help. Perhaps the biggest contribution your helpers can make is to what I call the spirit of the event. These two or three days are the culmination of months of effort. You have seen, I think, how much can go into it, how complex an operation it is, how difficult it is to weld a whole lot of elements, many not in your control, into an integrated whole. It is also, or should be, an important event for those who come. They may have travelled far, have spent a lot of money, have some particular object in view. To them one should offer the sense of a unique occasion and this I believe is generated, above all, by the spirit of the organizers. It can appear in the way receptions, formal and informal are arranged, but perhaps more in the general atmosphere of welcome and helpfulness, creating in all delegates the conviction that the conference was intended for them.

It is tempting to end on this note. Like the customer the delegate must always be right. No delegates, no conference. But when one has wooed him, altered arrangements, received him early or late one recognizes that conferences are not organized without tears.

Library Instruction Materials Bank

Ian Malley

Information Officer for User Education
Loughborough University of Technology

A wide range of print and non-print materials is associated with user education. The Library Instruction Materials Bank which has been set up at Loughborough, as part of the work of the British Library Information Officer for User Education, is an attempt to gather these materials and make them accessible to libraries and information services throughout the United Kingdom. It includes materials from all sectors of the library system, including university, polytechnic, college, school, public, national and special libraries.

Background

THE IDEA OF SUCH A BANK is not new. In the United States, Project LOEX at Eastern Michigan University Center of Educational Resources has, for the last six years, operated a deposit and loan scheme for user education materials, and this clearing house now has over 10,000 items. It was felt that, as an extension of other activities in gathering and disseminating information on user education, a similar clearing-house or bank ought to be set up in the United Kingdom.

In this country, the British Library Lending Division at Boston Spa has for several years run a handout scheme, collecting library information guides and distributing photocopies of them, but there have been disadvantages in this. First, the scope of the collection has been restricted chiefly to subject information guides, and secondly (and this has been the main disadvantage), the collection has been perforce a passive and not an active one, in that it has relied on the producers keeping the holdings up to date.

It was felt that the Materials Bank could offer something broader in scope, reflecting all aspects of user education, not just guides related to bibliographic instruction. As for collection and updating, the Information Officer for User Education would have certain advantages; by virtue of the peripatetic nature of his work, it would be possible to adopt a more active collecting role. Secondly, by sending out regular computer printouts of their deposited holdings (discussion of the computerization is included below) it would be possible to persuade producers to keep the collection alive without too much effort on their part. And thirdly, the newsletter *INFUSE* would keep the collection to the fore, and also serve as a current-awareness tool for new materials.

Objectives

The Materials Bank has been established to fulfil two primary functions:

1. To provide a service to those who need the various media and materials of user education.

Aslib Proceedings, 30(7), July 1978, p. 271–276. Printed in Great Britain

2. Indirectly, to effect an improvement in the quality of the materials produced.

The first objective needs little in the way of explanation or justification. The advantages of central access to materials or information about them are apparent; it should dissuade the librarians from trying to 're-invent the wheel', save them time in preparation and possibly save them money. More can be said of the second objective. The combination of greater awareness of what has been produced and time saved should enable librarians to build on the best that is already available to produce something better. The time, particularly, should allow them to sit down and think about what they produce, why they do it, as well as simply how they do it. Too many materials and media in user education are produced without much thought as to why they are produced and without enough consideration of the users' needs.

What is collected

The scope of the Materials Bank, as has already been described, takes in all aspects of user education. Any item which is produced for, or as the accompaniment to, the instruction, assistance or the education of the library and information user, is being included. This means virtually every type of item that figures at the librarian/user interface; bare lists of sections of the library's stock, however, are excluded.

The range of materials is therefore very broad, as may be seen from the list of categories which classify the Materials Bank.

Audio-visual guides
Books guides
Catalogue guides
Charts
Classification guides
Computer-assisted programmes
Course outlines
Evaluation forms
Exercises
Faculty co-operation information
Floor plans
Government publications guides
Lecture outlines
Library guides
Library (faculty) guides
Locator guides
Manuscript guides
Microforms guides
Periodicals guides
Programmed instruction
Publicity materials
Reference books guides
Report guides
Research guides
Research proposals
Services guides
Standards guides
Subject guides
Teaching handouts
Tests
Theses guides
Tours
Trade literature guides

FIG. 1: *Materials Bank*

The above categories all have two characteristics in common: they are all in print form and they are generally available free. At the same time, there are several categories of non-print materials—tape slide, audio-tapes, video-tapes, etc. which have a very important place in user education. These are almost never free, and since there are no funds with which to purchase these sorts of items (and it is improbable that producers will deposit gratis copies) then it is most unlikely that audio-visual materials will ever physically form part of the collection. Nevertheless, it is intended to gather and distribute information about them. This is an aspect of the Materials Bank which has not yet been developed and will be discussed later.

So far there have been few problems in getting producers to deposit their work in the Bank, yet occasionally there has been some reluctance, usually for the following reasons:

1. It is understandable that if materials which have been produced are felt to be novel, the producers will feel that they deserve credit and recognition for it. Depositing it in the Materials Bank might lead to a feeling of 'giving up control' over it, with possible loss of recognition due.
2. Some producers have borrowed so freely from other sources, including copyright source, that they naturally are disinclined to offer them with their own imprint.
3. Many librarians are unwilling to allow their materials to be used out of context. Some materials (*e.g.* question sheets, case studies, and some information guides) are produced primarily for a lecture or a seminar. Occasionally they can stand on their own, but often they make only half-sense to others. Obviously librarians are unhappy about giving an incomplete picture of their work.

These objections can be met in a number of ways. In the first instance, although the Materials Bank is not a publication, it is a way of having work circulated with one's name on it, and this should ensure recognition. In the second case, the proper recourse is to quote one's source and say in what direction indebtedness to the original work lies. In the final case, some of the categories in the classification scheme of the Bank should indicate to potential users the situation in which materials have been used; *e.g.* anything in the 'Exercises' category must have been used in association with a lecture or seminar. Another useful category, 'Teaching handouts', is a catch-all for anything connected with lectures and seminars and not intended for general availability in the library.

Organization of the collection

At an early stage it became clear from the handling of requests related to materials in the Bank that the retrieval of information was beyond our manual capabilities. The sifting through the Bank, the writing and typing up of lists of materials, was a laborious and time-consuming process. The computerization of the Bank was therefore necessary. It was decided to use the MINICS format which had been developed at Loughborough as a multi-purpose, local file structure simpler than MARC. MINICS is easy to use, but the overriding reason for using it was that the input and retrieval could be done using the manpower and expertise already on the spot. A very basic input sheet was initially passed on to the clerical assistant for proper input; more recently, however, the assistant does most of the input directly from the materials. One or two elements are not simple clerical tasks but require some knowledge of classification and indexing.

The category 'Type of material' draws on the various categories of the classification and indexing in Figure 1. 'Subject descriptions/headings' is the vitally important indexing field. Quite some time was spent in choosing a suitable list of subject headings or thesaurus; there was no entirely satisfactory list and the final choice, the 'Thesaurus of ERIC Discriptors', is supplemented by a short list of extra terms. This thesaurus was chosen because it had a reasonable coverage of items in three areas—education and its technology, librarianship and subject disciplines—all important components of user education. The compilation of a special thesaurus for the Bank was ruled out chiefly on the principle, illustrated by the use of MINICS, of applying available expertise.

Accessibility and the dissemination of information

The Materials Bank is accessible to all library and information personnel and anyone else with an interest in these matters. There is no charge for its services. Although it is possible for visitors to consult the Bank in Loughborough, most enquiries for information on the materials come by letter. These tend to be fairly simple, and usually related to materials in a particular subject discipline or a particular type of material. Quite complicated questions can be handled easily, however, *e.g.* exercises for second-year undergraduates in physics before 1976. The Bank is interrogated and the printout is then sent to the enquirer.

In Phase 1 of operations no materials were distributed and therefore the enquirer had to follow up the printout with a request to the various libraries for the listed materials required. But from the beginning it was hoped that eventually there would be some distribution of materials and in Phase 2 this has been possible to a limited extent. There has been some justification for operating in this way; once the Bank became a reasonable size, it was costly for the enquirer, in time and postage, to write to what was sometimes a large number of libraries to get the materials wanted. There was similar expense for some producing libraries who were bombarded with a variety of requests.

There were three possible methods of distribution:

1. The loan of materials. This was swiftly ruled out. First, the time, labour and postage expense involved in issues, returns, reservations, recalls, etc. make this out of the question, and secondly, waiting lists would be inevitable, a possible cause of the mushrooming of clearing-houses in the U.S. in the last few years. Project LOEX was the first of the clearing-houses; much of their distribution has been by loan only, and dissatisfaction with consequent waiting lists could be one reason why there are now as many as thirty clearing-houses for user education materials.
2. Photocopying the materials and then selling or giving them away free. This was the choice of the British Library Lending Division in its Handout Scheme. It is a solution that involves almost as much administrative work as lending, and also brings in copyright problems. Apart from this, and more important, it destroys the graphic and design quality of the original.
3. Giving materials away free. This assumes having multiple copies in the

Bank. Again there is some administrative work and postage involved, but much less on this occasion; one disadvantage here is the extra space needed to house the extra copies.

This last option was the one chosen. Not all libraries have felt able to send in multiple copies (ten copies are sought), chiefly because they want to retain as much control of their products as possible, but also because they value the exchange of information when enquiries are made direct to them. However, they have been prepared to continue sending in single copies which are then treated as reference copies, which are neither lent, sent nor photocopied.

Extensions and products of the Bank

Until recently, only if copies of materials were actually deposited in the Bank would there be information about them on the print-outs. The Bank is now being extended to include materials which have not been deposited and for which no copies are held. This applies to non-print materials in particular. In this respect the Bank is moving towards the traditional data base; the inclusion of non-deposit items makes replies to enquiries more complete. The contents of the Bank have been further extended by the inclusion of papers, books, etc. written on user education. For obvious indexing reasons only items of this type actually held are fed in to the computer. The more general reasoning behind this extension is that materials alone are not enough in planning a course of instruction. Knowledge of the techniques and the experiences of others are essential, and this is often to be gained from articles and case histories.

The combination of the above additions to the Bank should enable enquirers to receive an almost complete learning package, containing faculty co-operation information, print materials, audio-visual materials, lecture outlines, teaching handouts, exercises, competence tests, evaluation forms, case studies, etc. Note that 'complete' is qualified by 'almost'; the package is not ready for use, but must be modified and adapted to suit local requirements. The package is intended simply to enable someone to initiate and supplement his or her own course of user education, firstly, with the materials already prepared and, secondly, with the benefit of other workers' experience.

Uses of the Bank

It was noted earlier that one of the objectives of the Bank was to effect an improvement in the quality of the materials produced in user education. A step towards improving their relevance (if not the quality) has been to encourage academic staff in higher education to draw from the Bank materials in their own subject discipline (for the purposes of assessing the relevance of the materials to them and their students) and hence to write up reviews of materials, techniques, etc. in their subject. There has been surprisingly strong interest in this project, and the first of several reviews in different disciplines are now being commissioned.

International co-operation

There is no plan as yet to build up a materials collection on a world-wide basis, although there have been a number of contributions from individual overseas libraries. Contact has been made with Project LOEX and some other clearing-houses in the United States, and there has been some exchange of materials.

Contact has also been made with embryonic Australian and Scandinavian clearing-houses. More formal exchanges of information and materials between the Library Instruction Materials Bank and other clearing-houses are a possibility and very desirable. There is no doubt that there is mutual benefit in increased co-operation with overseas groups; the Materials Bank was developed to overcome the isolation of individual workers in the United Kingdom, but breaking down this isolation between a number of countries is a natural extension of its activities.

For further information contact Ian Malley at Loughborough University of Technology.

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BRIEF REVIEWS

ANDERSON, I. G. Current British directories: a guide to the directories published in Great Britain, Ireland, the British Commonwealth and South Africa. 8th ed. Beckenham, CBD Research Ltd, 1977. 430 p. (ISBN 900 246 219.)

It is to be hoped that all people concerned with directories in any way are aware of *Current British Directories*, an eighth and new edition of which has recently been published by CBD Publications Ltd. For those people, nothing more need be said, as they should already appreciate the content and coverage of the directory. Others may need some more information about this important reference tool which contains details of directories, not only those published in Britain, but also a selection of those from the British Commonwealth, South Africa and Pakistan. Contents listings from the more specialized directories are included in their entries, and publishers' addresses are given in full. The introduction contains much useful additional information including details of libraries with directory collections and a warning against unscrupulous directory publishers.

CHEN, CHING-CHIH. Scientific and technical information sources. London, MIT Press, 1977. 519 p. (ISBN 0 262 03062 4.)

The author has accomplished the major undertaking of categorizing and annotating details of 3,650 reference sources of widely varying types without sacrificing currency. The closing date for entries was December 1976 and the majority of entries are for publications dated 1970–6, although important earlier works are included.

The guide is arranged in the following categories: selection tools; guides to the literature; bibliographies; encyclopedias; dictionaries (thesauri, abbreviations, English subject dictionaries and multilingual); handbooks; tables . . .; manuals . . .; guides and field guides; atlases and maps; directories . .; history; important series . . .; treatises and monographs; abstracts and indexes and current awareness services; periodicals; technical reports and government documents; conference proceedings, translations, dissertations and research in progress, preprints and reprints; patents and standards; trade literature; non-print materials; professional societies and their publications and data bases. Within each section the entries are grouped by subject and then arranged by title. Subjects include various branches of science technology and engineering. Medicine is not included as such but it is touched upon in other sections.

With such a wide range of material to cover, the guide is, of necessity, selective and there are some noticeable omissions. The primary criterion for selection was that the sources should be up to date. Many UK publications are included.

Each entry gives publication details plus, in most cases, a brief annotation and references to reviews. F. B. Jenkins's *Science reference sources*, 1969, which is superseded by this guide, is used as a review source for earlier material. Walford's *Guide to reference material* and Winchell's *Guide to reference books* are also among the sources cited which include monographs and journals.

There is an author index but, as many of the sources are better known by title or publisher, the guide is primarily designed to be used via its own headings, which are fully listed in the contents pages. There is no separate subject index.

A general guide of this type is bound to be useful in any reference library and this one is compact and quite easy to use. A very extensive reference list is included, which refers to literature studies, and which will be useful in itself.

DUNPHY, ELAINE M. *Compiler.* Oil: bibliography. 3rd. ed. Aberdeen, ANSLICS, 1977. 314 p. (ISBN 0 9503707 2 X.)

The bibliography is a selective list of material held in academic, government and public libraries in the North East of Scotland. Seventeen libraries have participated and the locations are given under each entry. It covers all aspects of the offshore oil industry and concentrates particularly on the North Sea industry. The main body of the bibliography contains over 1,000 entries and is divided into the following sections: bibliographies; literature guides and information services (on general and specific subjects); general background; North Sea oil; economic, industrial and political aspects; legislation; management, education and safety aspects; petroleum geology and exploration; ocean engineering; drilling and production; transportation, storage and distribution; environmental and pollution aspects; periodicals and, finally, non-book materials (including maps).

Individual periodical articles are not included although some of the lists in the first section cover these. Annotations are given when part of a more general work pertains to the oil industry. At the end of the bibliography is an alphabetical author and title index.

Aslib Directory:
Volume 1: Information sources in science, technology and commerce. 1977. Edited by Ellen Codlin. 640pp. (SBN 85142 102 0)
UK £24.00 (£20.00 to Aslib members).

On-line information retrieval sourcebook:
J.L. Hall. 1978 xii, 267pp. (SBN 85142 106 7)
UK £14.50 (£12.00 to Aslib members).

Directory of operational computer applications in United Kingdom libraries and information units:
edited by C.W.J. Wilson. 1977 iv, 196pp. (SBN 85142 092 3) UK £9.00 (£7.50 to Aslib members).

EURIM II; Proceedings of the European conference on the application of research in information services and libraries, Amsterdam, 23-25 March 1976. Edited by W.E. Batten. vi, 226pp. (SBN 85142 091 5)
UK £12.00 (£10.00 to Aslib members).

Retrospective index to the Journal of Documentation, volumes 1 – 30:
compiled by L.J. Anthony. 1977, iv, 72pp (SBN 85142 101 6)
UK £12.00 (£10.00 to Aslib members).

The Information Worker: identity, image and potential: proceedings of a one-day joint Aslib/Institute of Information Scientists conference, London, 22 November 1976; edited by Margaret R. Raffin and Rona Passmore. iv, 58pp. (ISBN 0 85142 099 0)
UK £3.25 (£2.75 to Aslib members).

Factors affecting the renewal of periodical subscriptions:
A.M. Woodward.
(SBN 85142 108 3)
UK £8.40: £7.00 to Aslib members.

EUROPEAN USER SERIES

1. **Data bases in Europe** – A directory to machine-readable data bases and data banks in Europe. 1977 Third edition. (SBN 85142 105 9)
£7.60 (£6.00 to Aslib members).

4. **User education** – towards a better use of information resources, proceedings of the EUSIDIC conference, Graz, 1-3 December 1976: edited by Maxine MacCafferty. vi, 139pp. (SBN 85142 096 6)
UK £7.60 (£6.00 to Aslib members).

OCCASIONAL PUBLICATION SERIES

19. **Assessing the need for short courses in library/information work:** Margaret Slater. 1976. iv, 88pp. (SBN 85142 090 7)
UK £6.75 (£5.75 to Aslib members).

20. **Conference attendance patterns amongst physicists:** Sandy Hensman. 1977 iv, 52pp. (SBN 85142 098 2) UK £6.00 (£5.00); O/s £7.50 (£6.25 to Aslib members).

21. **International tape standards for documentation and information processing: existence, aims and implementation:** Carole E. Wilmot 1977.
UK £5.00 (£4.00 to Aslib members).

ASLIB BIBLIOGRAPHY SERIES

8. **On-line information retrieval 1965 - 1976**
A bibliography with a guide to on-line data-bases and systems. 810 references: compiled by J.L. Hall 1977. viii, 125pp. (SBN 85142 094 X)
UK £7.50 (£6.00 to Aslib members).

Aslib Publications

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On-line information retrieval sourcebook

J. L. Hall

Culham Laboratory, Abingdon, Oxon, UK
(Euratom/UKAEA Fusion Association)

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Computer-based on-line information retrieval — 'instant information'—is surely one of the most important growth areas in library and information science. This timely Sourcebook will be helpful to the many librarians, information searchers, end-users and students who currently have a growing interest in on-line retrieval as a working tool. It includes the following notable features:

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North America: $43.50; Members $36
ISBN: 0 85142 106 7

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UNIVERSITY LIBRARY

AUGUST 1978
VOL. 30, NO. 8

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J. L. Hall

Culham Laboratory, Abingdon, Oxon, UK
(Euratom/UKAEA Fusion Association)

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Health and Safety Executive Laboratories' Libraries

Sheila Pantry

Senior Librarian, Health and Safety Executive
Red Hill, Sheffield

Paper prepared for the series on Library Information Management

Introduction

UNDER THE TERMS of the Health and Safety at Work etc. Act 1974, the Health and Safety Commission (HSC) was formed on 1st October 1974. The Health and Safety Executive (HSE) was established on 1st January 1975 as the operating arm of the Commission. The Executive includes six Inspectorates and the Employment Medical Advisory Service (EMAS). The Inspectorates are Agriculture Inspectorate, Alkali and Clean Air Inspectorate, Explosives Inspectorate, Factories Inspectorate, Mines and Quarries Inspectorate and Nuclear Installations Inspectorate. EMAS acts as the medical arm of the Executive and is the channel of medical advice to the Commission and the Inspectorates within the Executive, HSE has a large Information and Advisory Services Branch (DIAS) which includes among other things the Library and Translation Services. The library organization, although integrated on a broad basis, operates in two independent functional areas—services in support of the research laboratories and those to staff in Head Office and field organizations. The Executive carries out a considerable volume of research in its Health and Safety Laboratories (HSL). This paper describes the development of the library services in support of research in HSL. The laboratories, with a total staff of approximately 500, are located at Sheffield, Buxton and Cricklewood (London). Each laboratory has a library, the main one being located in Sheffield.

Historical background

The Buxton and Sheffield laboratories have their origins in research to improve the safety of British coal mines which was begun in 1908 under the auspices of the Mining Association of Great Britain. The national importance of the work was soon appreciated and in 1911 the Home Office took over control and new laboratories were established at Eskmeals on the Cumberland coast. In 1920 these laboratories were transferred to the Mines Department of the Board of Trade. In the following year the Miners' Welfare Commission decided to make capital grants for new and more centrally situated research stations and the Safety in Mines Research Board was appointed to guide the work. A new field station was opened in 1926 about two miles south of Buxton and central laboratories were opened in 1928 in Sheffield. After the coal industry was

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nationalized the laboratories became entirely government-financed and in 1950 they became known as the Safety in Mines Research Establishment. New laboratories were opened in Sheffield in 1957 to provide accommodation for the engineering and metallurgical work, and a major extension to rehouse the remainder of the Sheffield work was opened in 1962. Additions were also made to the Buxton laboratories, and particular mention may be made of a large coal-dust explosion gallery, opened in 1964, which made it possible to carry out full-scale tests of stone-dust barriers and other devices for arresting explosions.

The demand for occupational hygiene laboratory services arose naturally from the work of the Factory Inspectorate. The widespread use of potentially harmful substances became apparent when the Factory Inspectorate conducted a survey in the mid 1960s, and this led to the formation of an Industrial Hygiene Division in 1966 in Baynards House in Bayswater where work was done on systemic poisons, fibrogenic dusts and ionizing radiations. In 1973 the laboratory moved to more suitable premises at Cricklewood which permitted a considerable expansion of its activities.

In 1975 the laboratories at Buxton, Cricklewood and Sheffield were brought together as part of the Research and Laboratory Services Division of the Executive and in 1977 became known collectively as the Health and Safety Laboratories. Besides the laboratories the Division includes British Approvals Service for Electrical Equipment in Flammable Atmospheres (BASEEFA) at Buxton and a Statistical Services Branch at Baynards House. The work of the laboratories is supplemented as necessary by placing extramural contracts which provide access to expertise and facilities not immediately available within the Executive. Three distinct types of scientific activity are undertaken: research and development, scientific support for other parts of the Executive and the testing of equipment (often on a repayment basis). During 1976 the Executive spent £6 million on these activities. About 70 per cent of the expenditure went on research and some 37 per cent of the overall expenditure was on extramural contracts.

DIAS

In the Executive the libraries form part of the Directorate of Information and Advisory Services (DIAS) which has its own budget and consequently the HSL libraries receive their budgets from the main DIAS budget. Estimates are prepared nine months in advance and the financial year runs from April–March.

Budget allocation

Sixty per cent of the libraries' budget is allocated to periodicals, including abstracting and indexing. Approximately 700 titles are shared between the three libraries, and this number is justified by the wide range of research topics within the research programme. About 22 per cent of the budget is spent on books, reports, standard specifications, etc. The requirement for stock arises in various ways:

1. The library staff notify the research staff of new titles announced in publishers' catalogues, *Bookseller*, *BNB*, periodicals, etc.

2. Research staff see or are recommended to read new titles.
3. The library staff order reference stock known to be of use.

For a number of reasons paperbacks and microforms are purchased for the libraries. Paperbacks are preferred to hardcovers because new editions of technical and scientific books come out at such frequent intervals. Microform has been accepted for many years by scientific staff and it is certainly the cheapest and quickest way of getting foreign reports.

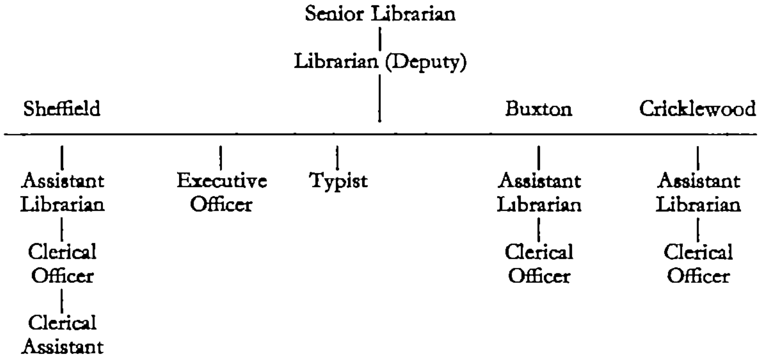
Interlibrary loans take about 5 per cent of the budget and computer charges about 10 per cent. The latter figure is altering due to the fact that the libraries began using the on-line facilities which became available in the UK in 1977. It is interesting to note that these new sources have stimulated the scientists' interest with a consequent increase in demand for interlibrary loans and stock items.

Stock

The libraries hold about 35,000 items in stock classified by the Universal Decimal Classification scheme. The material includes periodicals, books, report series, microfiche, pamphlets, patents, standards, mine incident reports, Royal Commission reports and annual reports including those from equivalent establishments abroad. The libraries have reciprocal exchange of literature with approximately 140 contacts abroad.

Library stock reflects the interests of the user laboratories. For instance, material held in Sheffield covers such topics as mechanical and electrical engineering, electronics, physics, chemistry, fluid mechanics and metallurgy. Buxton library has a special interest in literature on flame, combustion, explosives, explosions, frictional ignitions and electrical safety in flammable atmospheres. At Cricklewood, health physics, especially industrial noise and radiation safety, analytical chemistry and industrial hygiene are the major themes; coverage of areas such as microbiology, pathology and toxicology is expanding. Sheffield and Buxton have special collections of United States Bureau of Mines series and CIS abstracts on occupational safety and health. Sheffield library also maintains a reference file of all British Standards Specifications.

HSL Library staff organization



The Senior Librarian is responsible for the overall performance of the three libraries. The duties include responsibility for the maintenance of an information service to the scientific staff, the purchasing of periodicals, books, reports, etc., and ensuring that the library stock is compatible with the changing research programme. In addition she advises on the co-ordination and provision of technical library and information services to the Health and Safety Executive and its staff. She also is responsible for classification of all new stock, and scanning some of the literature for items of interest to HSL staff.

The Deputy Librarian is responsible for the day-to-day activities of the Sheffield library. She is also an extra link in the supervision of the two branch libraries. Both the Senior Librarian and the Deputy Librarian make frequent visits to the branches. This is necessary partly because the Assistant Librarians in charge of the operation at the branches are usually young graduate librarians beginning their careers. (The Assistant Librarian level is the first rung on the Civil Service librarian scale.)

The Deputy Librarian job description also covers editing of the HSL Abstracts, scanning of periodicals to alert staff to items of interest and also for selecting articles to insert in the abstracts, co-ordination of cataloguing for the three libraries, answering enquiries and carrying out literature searches using manual and on-line services.

The Assistant Librarians scan periodicals, select items for insertion in the HSL Abstracts, answer enquiries, carry out literature enquiries using both manual and on-line services and catalogue all new stock.

The purchase of stock is carried out centrally at Sheffield by a library clerk of Executive Officer (EO) grade who is responsible for checking all bibliographic details, ensuring that orders are despatched promptly, receiving goods, checking invoices and forwarding them to the cashier for payment. For security reasons all orders are countersigned by other designated members of the library staff. The EO also compiles the monthly return of expenditure and committed expenditure and assists in library counter duties dealing with personal and telephone library enquiries.

Clerical staff of Clerical Officer (CO) grade are responsible for interlibrary loans, library counter duties and filing of catalogue cards. There is a Clerical Assistant (CA) in Sheffield who is responsible for periodical receipt and circulation, photocopying and filing of all stock and we are fortunate to also have our own typist.

Library premises

The main library in Sheffield was purpose built and opened in 1962. The foresight that went into the design has eliminated any need for alterations, with provision of a browsing area where the scientific staff can sit and read at ease and also ten study stations located throughout the library. There are also work rooms for the library staff. Equipment for on-line services is located in a room just off the main library area and consists of a Diablo terminal and a Newbury visual display unit. The Cricklewood library is still in an embryo stage but is growing in size and occupies two largish rooms; one for periodicals and the other for the main library stock. The Buxton library has been in existence for many years and this year is being completely gutted, refitted and refurbished to bring it up to acceptable standards. There are microfiche readers in all the libraries, and there are reader/printers at Sheffield and Buxton: Buxton and Cricklewood have the same on-line equipment as Sheffield.

Services

Loans

Internal loans for monograph material mainly operate for an extended period. Although laboratory sections cannot regard items as belonging to them permanently, in practice they may be confined to someone's office or laboratory and used as desk/bench tools for a lengthy period. This is particularly true of subject areas which do not overlap with the work of other sections. If other members of staff want items already on loan they are recalled.

Periodicals present very different problems in that they need to be available for consultation in the library. This need is satisfied by making current issues reference only, whenever possible, and photocopying the contents pages for subsequent circulation. Readers can then either peruse the periodical in the library or request a photocopy of the relevant article. Such a system obviously depends heavily on the adequacy of the contents pages and is unsuited to many trade-type periodicals. The latter are available for circulation to members of staff with a direct interest in the topic. Similarly, abstract periodicals are circulated only to limited numbers of staff. Emphasis is placed on short-term loan with the bulk of the backfiles, from the 700 titles currently taken, remaining within the libraries.

Interlibrary loans

With the increased range of the research programme into non-mining areas demands for interlibrary loans have increased. At present we borrow some 8,000 items each year. Local resources are tapped as first port of call. The Sheffield and Buxton Libraries are fortunate to be members of the Sheffield Interchange Organization (SINTO) and thus have access to the substantial collections held by Sheffield City Libraries, the Polytechnic, the University, particularly the Applied Science and Chemistry Department libraries, together with numerous industrial and research libraries. Cricklewood library is also a member of the local co-operative scheme, CICRIS, besides utilizing other government departments in London, notable amongst which are Laboratory of the Government Chemist, Tropical Products Institute and Medical Research Council. The British Library Lending Division remains a firm stanchion of the service; one invaluable function that it fulfils is that of a substitute bookseller providing 'new books on approval'. Subject to the needs of our own staff there are no restrictions on loans to external enquirers. Periodical articles are photocopied within the limits of the Copyright Act and a charge is made to cover reprographic costs.

Selective dissemination of information

Although the total complement of the laboratories is over 500 only 370 are scientific and technical grades with the balance comprising administrative and industrial staff. The limited number means that a manual selective dissemination of information service is still practicable and produces worthwhile results. Most English language periodicals taken are scanned by a professional member of staff prior to circulation or being placed on the reference shelves; foreign language periodicals are scanned by the translators. In both instances, items known to be of interest are relayed to individual scientists if they would not otherwise see them. The annual research programme, updated quarterly by the Research Director's report, provides the basis for subject profiles maintained on card indexes. In addition to the manual SDI system, the laboratories also participate in two computer-produced services. The first is operated by the United Kingdom Chemical Information Service at Nottingham, using the CA Condensates database. Four profiles exist for the Gas Detection and Electrochemistry sections in Sheffield, with a further composite profile covering explosions, explosives, combustion and flame, representing subject interests of some Buxton staff. Output is fortnightly, in card form, and excludes abstracts. The second is operated by the Department of Industry using R & D Abstracts and NTIS databases. Since the later part of 1977 the INSPEC database has been added. A selection of users span a wide range of disciplines, including electrical hazards, fluid mechanics, hazard analysis, protective equipment and flame. Output is fortnightly, in sheet form, and includes abstracts. Recently, the Department of Industry facilities have been made available on-line in a pilot project to test a new software system called RADAB. Instructions are given at a terminal in Sheffield to run established profiles against each fortnightly file update and it is intended to systematically check and amend all profiles on-line in the near future.

Literature enquiries

Retrospective searches can be performed either manually or by computer or a combination of both. The library staff decide which abstract services are most relevant. In cases where the service is held in hard copy and is available on-line, the decision as to which to use is governed by the complexity of the enquiry and the staff work load. Currently we subscribe to DIALTECH and the British Library Automated Information Service (BLAISE). The rapid development in the quality of the library facilities offered to the scientists at Cricklewood can be attributed in large measure to these two services. Economic constraints mean that it is just not feasible to purchase long backfiles of periodicals and expensive abstract journals, yet the sections based there fulfil a vital back-up role to the Factory Inspectorate, which often requires immediate answers on the toxicity of chemicals or methods by which harmful substances can be analysed. On-line searching was really the only solution. The Sheffield and Buxton libraries, because they are longer established, do not have such a problem but, nevertheless, on-line systems have given us a welcome extension in search tools already available.

Publications

In 1977 the first issue of the combined periodical holdings list of the three libraries was produced. Since then a specially written computer program has produced the first HSE libraries union list, which also includes the periodicals held in the HSE's general library in Baynards House and the specialist periodicals held in the HSE Nuclear Installations Inspectorate's library. It is hoped to produce this list on an annual basis.

The monthly *HSL Bulletin* lists all catalogued accessions and is arranged in UDC order. A weekly 'List of forthcoming conferences, courses and exhibitions' is circulated to the laboratory staff. It is a by-product of the periodical scanning and is tailormade to the Laboratories' requirements.

The Safety in Mines Research Establishment Bibliography, 1969, is being updated and a supplement covering the years 1968–77 will be issued later this year. Inadequate bibliographical coverage of safety aspects of mining led to the development of an internal abstracts journal as early as 1952. As knowledge of its existence spread worldwide and requests for copies increased, it was decided to make it available on a subscription basis. Since 1969 the bi-monthly journal has been known as *Safety in Mines Abstracts* but from the beginning of this year the title will be replaced by *HSL Abstracts*. In line with the title change is an extension of coverage to include mechanical and electronic machine guards, noise control and measurement, dust control in industry and non-medical aspects of asbestos. Hopefully this improved version will gather together references from scattered sources and aid the work of all the sections for whom we are now responsible.

Translations unit

There is a translations unit consisting of six translators with a combined language coverage German, French, Russian, Polish and Italian.

Planning and developments

One advantage of working for a research establishment is that the research programme is a reliable indicator of future requirements. Along with the other HSE library at Baynards House, London (which was set up to service the various inspectorates in London and the provinces) the HSL libraries hope to develop an in-house database. A pilot project is currently being run in Sheffield, based on the Sigma 6 computer and using AERE, Harwell Status II program.

Acknowledgement

The author wishes to thank other members of HSE staff for their comments and help in preparation of this paper.

Weldasearch—the development of a small computerized data base

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Introduction

FROM MODEST BEGINNINGS a decade ago and foresight in the planning stages has grown an inexpensive, efficient and effective on-line retrieval system. This paper traces the development and mechanization which resulted in a viable bibliographic information system, describes its present capabilities, and indicates directions for future growth.

Weldasearch is the name given to the services marketed by the Information Department of The Welding Institute. The Institute's formation in 1968 by the merger of the British Welding Research Association and a professional body, the Institute of Welding, placed it in a unique position with contacts and clients throughout the world in research and educational organizations and a professional membership of welding engineers and metallurgists. Because welding is not confined to any one discipline or industry the Institute's activities range widely, from microelectronics to shipbuilding, and non-destructive testing to health and safety. The sudden pressures placed upon the Information Department to provide services to the increased clientele brought to fruition work which had begun some time before.

Historical development

In 1965 the library reappraised its activities with a view to developing information services which those other than information staff could also use. It set about producing a list of welding and associated terms as a prelude to studying what use could be made of post co-ordinate indexing and its associated techniques which were then in vogue. Free language searching was not considered efficient at this early stage and, in retrospect, would have been expensive and more confusing to users who were untrained in information handling. The controlled language approach was adopted for its accuracy in describing concepts despite the greater efforts required in thesaurus preparation and document indexing.

With completion of a thesaurus the next decision was the choice of a suitable document retrieval method. There were several possible methods then available, all relying on comparison of document numbers allocated to different keywords:

(a) A completely computerized system,
(b) A completely manual system, *e.g.* optical coincidence or edge punched cards,
(c) A mixed system. Computer-produced indexes used for manual searching with the possibility of development into computer searching when files grew very large.

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The first two alternatives were rejected because

for (a) No computer was available to the organization that could do on-line searches economically, and

for (b) The completely manual system was considered:

- (i) Too inflexible for development,
- (ii) Too expensive in capital equipment,
- (iii) Too slow in preparation, *e.g.* punching,
- (iv) Too bulky to store,
- (v) Too difficult to update and reproduce for distribution.

However, computer-produced indexes searched manually (option c) offered scope for development and required only modest outlay on capital equipment to initiate a system. Experiments with a regularly updated KWIC (Keyword In Context) index showed that this was more expensive to produce and about as costly to reproduce and distribute as a dual dictionary index. A separate input and a separate computer run would be required for KWIC whereas the dual dictionary could be generated and printed as a by-product of work necessarily done as a normal routine. In addition, and of great importance, the KWIC index was not popular with the experimental users. It was decided to use the dual dictionary system, consisting of two identical indexes. Each keyword was printed in alphabetical order with the document accession numbers, which had been indexed with that keyword, arranged in columns by the last digit. A manual search could be made by selecting appropriate keywords, one from each of the two indexes, and comparing document numbers. Thus a search for friction welding of aluminium (Figure 1) would retrieve document numbers 115, 142, 179, 550, 1236, 1402. Abstract cards arranged by document number gave full details of the references thus retrieved.

The need for SDI

Although retrospective searching could now be accomplished by manual searching of the dual dictionary indexes, selective dissemination of information (SDI) on a regular basis still presented a problem. The Librarian, and the Information Department when it was later established, built upon their knowledge of research staff activities and interests to provide relevant current information on an informal basis and also developed a regular service of photocopying periodicals contents pages, so dispensing with the archaic method of journal circulation. It soon became clear that even this activity was wasteful of staff time and gave only limited information (*i.e.* author and title) within one form of publication, the periodical.

Once the dual dictionary production programs were running satisfactorily with monthly updates it became possible to search these regularly by matching keywords relating to each user's interest. This was a tedious and time-consuming manual operation and SDI computer programs for batch searching were prepared to provide monthly lists of relevant document numbers for each user's profile. In 1973 computing was switched to another bureau, Cybernet Timesharing Ltd., to gain advantages of the high speed of SDI searching, development and expansion of retrospective search programs and the greater expertise

FRICTION WELDING										ALUMINIUM									
80	1281	142	723	574	115	166	387	8	179	60	21	22	53	34	25	36	37	38	19
210	1531	682	1513	604	145	276	707		539	100	61	42	113	44	35	66	47	48	179
550		1402		1124	555	726	817		1309	190	311	62	123	194	115	176	117	58	369
1410					1005	816	1007			260	321	82	143	504	1025	256	277	88	649
					1185	1006	1237			400	461	142	223	664	1335	316	367	98	779
					1235	1236				520	1231	222	413	864	1365	366	427	128	1379
					1515					550	1351	242	473	1004	1485	516	627	438	
										880	1361	282	1133	1304		556	787	658	
										950		412	1343	1434		696	1117	1228	
										900		782		1494		1136	1147	1238	
										1260		972		1514		1236	1327	1458	
										1290		1352				1276	1387		
										1350		1402					1477		
										1380		1462							
												1472							

FIG. 1: *Dual dictionary index search. Friction welding of aluminium*

and service facilities they offered. After an eighteen-month trial period by research staff the retrospective and SDI services were offered more widely to Institute clientele. Following further developments in computing facilities an on-line retrospective retrieval service was announced in 1975, available primarily to staff and members but also to other external enquirers under certain conditions on a payment basis. This service has been heavily used and has proved itself to be a simple, reliable and inexpensive operation.

The SDI profiles vary considerably. Some are designed for very high precision and produce only three or four items per year, to the users' complete satisfaction. The majority of profiles have much more than these, with an emphasis on recall, and typically contain about 10–30 items per month. The original profiles written for members of staff tend to be on the academic and research level but as outside subscribers continue to increase in number the move has been towards more practical papers. Wherever possible new subscribers are contacted direct by the information staff to identify the processes, materials, equipment, etc., required in the profile. During the first few months feedback is common, but after the third month satisfaction is usually obtained although modifications are made throughout the life of the profile as the interests of the user change. The full set of profiles is kept continually under review with the intention of identifying areas of common interest where a routine bibliography may be produced as a by-product.

The thesaurus

The first draft thesaurus was created by extracting relevant terms from the Engineers Joint Council *Thesaurus of Engineering and Scientific Terms* which had just been published, but the result was rather academic, unwieldy in structure and did not cover the subject in the depth required. However, it served as a basis for further work, being supplemented and expanded by terms drawn from an examination of a sample year of the *Bibliographic Bulletin for Welding* and 1,500 patents. The task was completed after one and a half man-years' work and published in 1969 as *A thesaurus for welding and allied processes,* later to be revised and published under the auspices of the International Institute of Welding as *International Welding Thesaurus 1974.*

A typical page from the thesaurus is reproduced (Figure 2) and shows relationships between keywords used for indexing (upper case) and lead-in terms (lower case). An hierarchical system is employed with broader terms (BT), narrower terms (NT) with BTs posting on, general terms (GT) and specific terms (ST), but in this case the relationship is non-posting. For example, to post all welding processes to the very general descriptor 'welding' would be meaningless in a welding thesaurus, so the relationship is shown by GT/ST. Related terms (RT) are used for conceptually related descriptors where it is useful to draw the indexer's attention to other terms which may more accurately represent the concept he has in mind than the descriptor initially selected.

All the keywords in the thesaurus have been allocated to various subject areas according to the different facets of their meaning. There are twenty one tables (Figure 3) showing BT/NT relations in conventional family tree format by the use of continuous lines and GT/ST relations by dotted lines. In this manner it

NICKEL (12B)
UF/ Nickel powder +
GT/ NONFERROUS METALS
RT/ NICKEL ALLOYS
NICKEL STEELS

NICKEL ALLOYS (12B)
UF/ TD nickel +
NT/ HASTELLOY
INCONEL
MONEL
NIMONIC ALLOYS
GT/ NONFERROUS METALS
RT/ CONTROLLED EXPANSION ALLOYS
NICKEL
NICKEL STEELS

Nickel chromium steels
USE/ AUSTENITIC STAINLESS STEELS

Nickel molybdenum steels
USE/ NICKEL STEELS

Nickel powder
USE/ NICKEL
POWDER

NICKEL STEELS (12A)
(Not maraging steels; used for 3½%, 5% or 9% types together with suitable A term from table 12A)
UF/ Nickel molybdenum steels
BT/ STEELS
GT/ FERROUS METALS
RT/ CRYOGENIC STEELS
HIGH ALLOY STEELS
LOW ALLOY STEELS
MARAGING STEELS
NICKEL
NICKEL ALLOYS
STAINLESS STEELS

NIMONIC ALLOYS (12B)
BT/ NICKEL ALLOYS
GT/ NONFERROUS METALS

NIOBIUM (12B)
UF/ Columbium
Niobium alloys
GT/ NONFERROUS METALS
REFRACTORY METALS

Niobium alloys
USE/ NIOBIUM

Nitrates
USE/ SALTS

NITRIDES (12C)
GT/ CHEMICAL COMPOUNDS

Nitriding
USE/ SURFACE HARDENING

NITROGEN (13)
UF/ Cracked ammonia +
Nitrogen strengthening (of stainless steels) +
BT/ GASES
GT/ CONSUMABLES
RT/ SHIELDING GASES

Nitrogen strengthening (of stainless steels)
USE/ NITROGEN

Nitrogen strengthening (contd)
USE/ STAINLESS STEELS
(use more specific term if possible)

NODULAR IRON (12A)
UF/ Ductile cast iron
SG iron
Spheroidal graphite cast iron
BT/ CAST IRON
GT/ FERROUS METALS
RT/ IRON

Noise
USE/ ACOUSTICS

Nomenclature
USE/ TERMINOLOGY

Nomograms
USE/ NOMOGRAPHS

NOMOGRAPHS (19)
UF/ Graphical methods *
Nomograms
BT/ DIAGRAMS

NONCONSUMABLE ELECTRODES (14)
UF/ Carbon electrodes +
Electrode displacement +
Electrodes (nonconsumable)
Resistance welding electrodes +
Seam welding wheels +
Tungsten electrodes +
Welding electrodes (nonconsumable)
ST/ INSERTS
GT/ PROCESS EQUIPMENT
RT/ GTA WELDING
INDENTATION
THORIATED TUNGSTEN
TUNGSTEN

NONDESTRUCTIVE TESTING (8)
(Use more specific term if possible)
UF/ Inspection (testing)
Leak detection +
Weld inspection *
NT/ DYE PENETRANT TESTING
EDDY CURRENT TESTING
MAGNETIC PARTICLE TESTING
MAGNETOGRAPHIC TESTING
OTHER NDT METHODS
RADIOGRAPHY
ULTRASONIC TESTING
GT/ TESTING
RT/ ACOUSTIC EMISSION
IMAGE QUALITY
IN SERVICE OPERATIONS
MECHANICAL TESTS
VISUAL INSPECTION

NONFERROUS METALS (12B)
(Use more specific term if possible)
ST/ AL CU ALLOYS
AL MG ALLOYS
AL MG SI ALLOYS
AL SI ALLOYS
ALUMINIUM
ALUMINIUM ALLOYS
AL ZN MG ALLOYS
ANTIMONY
BERYLLIUM
BISMUTH
BRASSES
CADMIUM
CALCIUM
CHROMIUM
COBALT
COPPER
COPPER ALLOYS
CUPROALUMINIUM
CUPRONICKEL
GALLIUM

FIG. 2: *International Welding Thesaurus*

6. METAL WORKING AND METALLURGICAL OPERATIONS

- ADHESIVE BONDING (15B)
- ANODISING (12C) (Surface oxidation)
- DEGASSING (11) (Removal of gases)
- DISPERSION HARDENING (Not age hardening)
- DRESSING
- ELECTROPLATING (12C)
- FIT UP
- GRINDING
- HEATING (11)
- HEAT TREATMENT
  - HARDENING (Thermal processes only,
    - AGE HARDENING
    - SURFACE HARDENING (Thermal)
  - NORMALISING
  - POST HEATING
  - PREHEATING
  - QUENCHING (11)
  - SOLUTION HEAT TREATMENT
  - STRESS RELIEVING (Thermal processes only)
  - TEMPERING
- MACHINING
  - DRILLING (Not rock drilling)
- MECHANICAL CUTTING
- MELTING
  - ELECTROSLAG MELTING
- METALLISING (12C) (Deposition in vacuum)
- METAL WORKING
  - BENDING
  - DRAWING
  - EXTRUSTION
  - ROLLING
  - SWAGING
  - UPSETTING
- SPARK EROSION CUTTING
- SPRAYING
  - ARC SPRAYING
  - FLAME SPRAYING
  - PLASMA SPRAYING
- STEEL MAKING
- STRAIGHTENING
  - FLAME STRAIGHTENING
- SURFACE PREPARATION
- TINNING (12C)
- ULTRASONIC PROCESSING (Not joining)
- VIBRATORY STRESS RELIEF
- WORK HARDENING (9)
  - PEENING
- ZONE REFINING

7. GENERAL OPERATIONS

- CLASSIFYING
- COMPARISONS
- COMPUTATION
  - FINITE ELEMENT ANALYSIS
- COMPUTERS
- DESIGN
- ELASTOPLASTIC ANALYSIS
- EVALUATION (Assessment of properties)
- FRACTURE MECHANICS
- IDENTIFICATION
- OPTIMISATION (Optimal methods)
- SCOPE
- SELECTION
  - PROCESS SELECTION
- STATISTICAL METHODS
- STRUCTURAL ANALYSIS

- CONSTRUCTING
- COOLING (11)
- DRYING (11)
- ENCAPSULATION
- IN SERVICE OPERATIONS
- MAINTENANCE (15A)
- MANUFACTURING
  - ASSEMBLING (in a factory)
  - MASS PRODUCTION
  - UNIT PRODUCTION
  - ELECTRODE PRODUCTION
- MATERIALS HANDLING
- PACKAGING
- SITE OPERATIONS
- STORAGE
- SUPPLY
- UTILISATION (15A)
- WORK STUDY

FIG. 3: *Thesaurus tables. No. 6. Metal working and metallurgical operations*

is easy to visualize the relationship between descriptors and to find all terms in a particular subject area. In the text of the thesaurus each descriptor has a number in parenthesis indicating the table in which it appears.

It was intended that this thesaurus should contain all the information necessary for the controlled language indexing of the literature of welding, and that it be used as widely as possible for the indexing of scientific and technical literature so that all major literature services dealing specifically with welding have compatible indexing systems and particularly so that exchange of information on a world wide basis can take place.

The data base

To cover the wide range of sources in the welding literature it was decided to produce abstracts of up to about 200 words prepared by the information staff, supplemented by edited abstracts obtained from a variety of sources by agreement and exchange with other abstracting and indexing services in the UK and abroad. Keywords are assigned and the abstracts typed in a standard format on 8 × 5 inch cards, and filed in sequential document number order. A duplicate set of cards filed alphabetically forms the author index. The decision on the form of storage of abstracts led to the rejection of computer storage on grounds of the high cost for preparation and data base maintenance. The requirement that they be included in every form of service meant some type of individual abstract record. The department has been placed in the all too common situation of having to satisfy a wide variety of needs while operating on a minimal budget without access to funds for capital expenditure. Since the initial number of abstracts was not excessive, cards were stored in boxes and later on a multi-layer revolving drum, selected for its high capacity and ease of use in hand pulling, as well as low capital and running costs. As storage space has been filled cards are now microfilmed: a more convenient form for storage, duplication and mass distribution.

The computer stores only document numbers and their allocated keywords. Retrospective searches and SDI routines produce lists of document numbers as a result of matching numbers associated with keywords in an inverted file. Full details are retrieved by searching the sequential abstract file for document number via a high speed microfilm reader printer and the microfilmed abstracts reproduced as required.

The data base currently consists of some 40,000 abstracts representing the available literature back to 1967, and increasing at the rate of some 4,300 per year. Together with the various computer programs and indexes this collection provides the basis for a wide variety of information services.

Services offered—*SDI*

The file produced from the monthly update routine is searched in batch mode and matched against each user's profile. A list is printed giving users' names and document numbers of items relevant to their interests. Copies of the abstracts cards, before microfilming, are manually retrieved, photocopied, collated and sent to users in booklet form.

Complete retrieval system

Copies of the dual dictionary retrieval system together with copies of all abstracts are supplied on a monthly basis to enable subscribers to provide current awareness services within their own organizations. The complete back-file of abstracts and dual dictionaries can also be supplied, either in paper or microfilm form, so giving a complete literature retrieval capability. For those with computer terminals the dual dictionary search stage can be dispensed with and the bureau's computer accessed direct for on-line searching.

Abstracts service

No journal of abstracts is published but for those who do not require the complete retrieval system it is possible to supply copies of the abstracts only in paper or microfilm form. These can be integrated with an existing information system and the allocated keywords can be supplied for this purpose.

Bibliographies

By using the complete data base and on-line searching, bibliographies on any related subject can be quickly prepared, modified or updated. In addition to normal retrospective searching a series of regularly published bibliographies on topics of common interest has proved popular and these are updated annually. The original typed abstracts cards provide easily reproduced, high quality copy for this service.

Library support services

The Library provides full support services for Weldasearch operations, including provision and administration of originals, scanning and selection procedures for input material. About 80 per cent of the items abstracted are held in full original form and the majority of these can be photocopied at a standard charge, subject to copyright legislation. Advice on alternative locations for material not held is offered wherever possible on request.

Current developments: an on-line abstracts data base

In considering the future role of an information system such as Weldasearch one strays into the realm of probability with unknown variables working for and against its success. The advent of the ready availability of on-line searching in recent times has added a new dimension to retrieval work kindling anew the fond hope of information at the touch of a button. Weldasearch was designed as a complete system in a specialist area of knowledge co-ordinating discipline and industry oriented material. To those already fully automated reliance on manual storage and retrieval of abstracts may seem primitive, although much more cost effective on this scale of operation. It still seems possible that simplified on-line searching linked to retrieval of microfilmed data can have a role to play in the information activities of the future. When given the enormous costs involved in data input on a large scale it appears that full text storage in microform linked to computer indexes and retrieval devices may be in evidence in information systems yet to be developed.

It cannot be denied that machine-readable abstracts are advantageous for the many users wishing for immediate access to the files. With this in mind the Institute obtained a grant from the Department of Industry, the first of its kind from a Government department, towards the cost of making the Weldasearch data base fully machine-readable. The purpose of this exercise was to expand the casual use of the data base by making it more widely available via the various on-line data base operators. The immediate market within the UK industries using welding has been saturated by earlier publicity efforts but it is expected that a considerable market exists in occasional use from a much wider user population, especially overseas. This wider potential user group are not sufficiently involved in the immediate subject area to subscribe to the regular SDI or retrospective search services offered but would make occasional but irregular reference to such a system were it made easily accessible. Other specialist organizations are awaiting the outcome of these operations which, if successful, will herald the development and expansion of similar services from research associations and like bodies of expertise. A wider distribution of such information sources will overcome some aspects of limited coverage and retrieval capability in the larger on-line services while allowing the specialists to operate their own data bases using their expertise to greatest effect.

Retrospective file conversion

The Government grant gave aid for the production of a machine-readable data base under contract to a bureau service. The ten year back file of some 36,000 abstracts cards were retyped in OCR 'A' font and transferred via an Optical Character Recognition unit to computer for data manipulation and preparation of magnetic tapes. The data is formatted in a number of preselected fields, with subfield markers:

(1) Document accession number, *i.e.* abstract number,
(2) Title of document,
(3) Author(s),
(4) Bibliographical reference,
(5) Comments, *e.g.* language of document if not English,
(6) Abstract,
(7) Keywords.

Keywords are allocated from the *International Welding Thesaurus* and it is hoped that data base operators' software will also allow for free language searching of title, and possibly abstract, fields. The additional cost and effort in allocating other fields such as publication date, author affiliation, ISSN/ISBN could not be justified, nor the preparation of data in upper and lower case, although input from 1978 will have the latter features.

Computer tapes of the 1967–76 files are now available on lease for in house use and it is hoped the complete system will be available on-line from at least one American commercial data base operator during 1978 and a European one in 1979. As a by-product computer output microfilm (COM) copies of the files are also available as a low cost alternative to on-line printout of full abstracts, and a COM author index is in preparation.

SDI procedures under the new system are still in the design stage but a method similar to current operations is envisaged for some time to come. If a demand exists the possibility of a regularly published bulletin could be investigated. As SDI users gain access to computer terminals a monthly personal printout of profile-retrieved items will become possible. In the distant future a selective COM fiche could provide the subscriber with his monthly SDI update with the added advantages of speed, quality, packaging and cost savings.

Current file preparation

With the backfile conversion now complete the Institute is looking at alternative methods of data preparation for the current and ongoing files. From the maze of data preparation and word-processing equipment a system is envisaged consisting of keyboard and editing visual display units (VDU) for record preparation and transfer to a magnetic storage device. From the storage device records will be input to the computer monthly for file updating and manipulation. These records may also be printed off-line on to a local high quality interchangeable typeface ('daisy wheel') printer for production of SDI profiles, booklets, bibliographies, reading lists, bulletins, or other hard copy, *e.g.* for proof checking of input records. Later abstractors, may work directly on to a VDU using a preformatted layout on the screen, rewriting or editing as they examine the original documents before them. The possible use of on-line computing at the input stage could provide a temporary file of current items to avoid duplication, also holding entries obtained by exchange agreements awaiting full processing, allocation of keywords or addition of full bibliographic details.

Conclusions

The Weldasearch system has shown itself to be extremely flexible and even this comparatively small enterprise has found it possible to develop variant services to fit novel individual requirements.

Computer storage of abstracts requires great file capacity and is expensive. Retrieval time is comparatively slow, especially with free language searching and thus costly, as is printout time. A computer stored abstracts system was not found to be feasible using a computer bureau facility on a time-sharing basis. Manipulation of only keywords and document numbers compared favourably and the efficiency of the thesaurus brought visible benefits in retrieval cost savings. Storage of abstracts on card or microfilm is more economic than on-line and reproduction more easily and cheaply accomplished. Because the total data base is still comparatively small (40,000) and the SDI user population low (about 140) it was not previously considered economic to attempt computer storage of abstracts, computer typesetting and journal production.

On-line searching was not available when the system was instigated in 1967 but computer sorting of keywords and document numbers did not present problems. Increased mechanization was possible throughout without redesigning the system. Given the comparatively small data base in terms of storage requirements Weldasearch has had the advantages of many larger computer-based services without the enormous storage and operating costs they incur. Retrospective facilities are immediately available for manual or on-line searching as well as selective dissemination and specialized outputs such as bibliographies.

The service is easily adapted to meet individual requirements and a back-up photocopying service can be provided.

It was realized that disadvantages of the old system included the lack of variation in searching fields of information. Enquiries had to be presented with search logic using keywords conforming to the thesaurus and searching could not be accomplished in author (except manually), title or abstract fields. The computer output of document numbers with keywords was of no use without the abstracts file, and further searching of this file on cards or microfilm could be a tedious operation when many items were involved.

The recent completion of the retrospective file conversion allows the possibility of running the two parallel systems while implementing the new and phasing out the old. It will be an opportunity to discover the problems inevitably to be found in any planned development programme and still draw benefits from past experience and operations. The time has not yet come when a full assessment of the new system can be made. Only after several years' full on-line experience has been accumulated can such an operation be realistic or useful. Then will come the time for reappraisal, replanning and further improvement of the service.

The upgrading of the service has been a natural development in the growth pattern of Weldasearch, bringing it to the centre of current technology. It has kept pace with the rapid movements in the information retrieval industry and, as it takes its place alongside other on-line services, will provide a useful testing ground for the growing number of smaller data bases considering similar conversion activities.

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Forthcoming events bulletin

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BEECHAM PHARMACEUTICALS RESEARCH DIVISION employs about 1,000 people engaged on pharmaceutical research and development. These are at present distributed over five major and several minor research sites. Each major site has an Information Unit and a Library: these work in co-ordination and certain tasks are undertaken by one unit on behalf of all the others. Walton Oaks is responsible for disseminating information on forthcoming events. An account of the system used in this organization for selective dissemination of technical information by means of an information bulletin has been published.[1] The system in use for the dissemination of details of forthcoming events such as conferences, lectures, exhibitions and courses of interest to the Research Division is somewhat similar. As little seems to have been published on such systems it seems worth while to describe the methods currently used here.

Scope

The interests of the customers of Information Services embrace chemistry (including physical chemistry), medicine, biochemistry, microbiology and much associated technology. The events they may want to attend range from the large international congress to the small local meeting.

Format

Every fortnight a bulletin is issued entitled 'Future Events'. This contains a listing of all forthcoming events picked up by Information Services arranged simply in date order. Once a year, about December, this bulletin is replaced by a cumulated edition containing all events known for the forthcoming year. This cumulated bulletin is broken down into subject categories. The cumulated bulletin contains less than the sum of all the items in the ordinary bulletins, since many meetings are announced and take place within less than a year. Various research sites also keep notice boards in their libraries where forthcoming events of interest to that site are displayed in date order. This is accomplished by cutting out the entries from spare copies of the bulletin. The bulletin is printed in-house and about 250 copies are issued each fortnight, many of which are shared.

Input

Information is prepared for the bulletin on simple cards (printed in-house). All the information scientists use these. As the journals are scanned for the information bulletin, items on forthcoming events are also extracted. When information

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on a future event of interest is noticed a check is first made against the diary (one is kept at each site) to see that the item has not been duplicated. If it has not, a card is either typed or written out according to taste and the cards are sent, usually once a week, to Information Services at Walton Oaks together with any further information held (*e.g.* brochures, programmes). Here they are again checked against the site diary (as it is not unusual for two information scientists at different sites to pick up the same information at approximately the same time). The cards are then arranged in date order and the fortnightly bulletin typed directly from them.

The diaries referred to are plain loose-leaf files where an entry is made for each item under its commencing date. These diaries have been found useful as a cross-check on changed dates, locations and titles. The cards are filed by the Walton Oaks Library in chronological order as is the information relevant to each item.

Sources

The sources of information used are many and various. *World Meetings* (Macmillan, USA), the Aslib *Forthcoming International Scientific and Technical Conferences*, the calendars and diaries issued by various learned societies are some of the more obvious. Brief announcements in specialized journals yield news of some of the more recherché meetings. The classified advertising pages of journals such as *Nature* also produce many announcements of interest, especially courses. Individual research workers are encouraged to pass on details of any meetings they may hear of. Finally, information ranging from glossy coloured hand-outs to odd duplicated sheets arrives unsolicited through the post and, with the passage of time, we have worked our way on to the mailing lists of many institutions and societies.

Follow-up

Each issue of 'Future Events' has attached a slip on which the reader can request further information on any event simply by filling in the item number and his or her name. These slips are returned to the library at Walton Oaks. Here the library staff check the requests against the cards. If sufficient details of the event are available, these are simply photocopied and sent to the enquirer.

If there are no (or insufficient) details held, a note is made on the card and a letter of enquiry sent to the contact address. The card is then filed in a different section of the filing drawer until details are received. If the time for a meeting is approaching and details have not been received a further enquiry is sent. The centralization of the system means that, however many people in the Research Division are interested in a particular meeting, only one set of enquiries need be made.

Statistics and response

During 1977, twenty-five ordinary 'Future Events' bulletins were issued, together with one cumulated edition. The number of items contained in the ordinary bulletins was 1,924 (an average of just over 75 entries per bulletin). The cumulated edition contained 479 entries, a few of which were duplicated (*e.g.* a conference on 'Biochemistry in Medicine' would probably be entered in both the biochemistry and the medicine sections). The number of items requested from the ordinary bulletins was 957 (*i.e.* a 'relevance' of about 50 per cent). From the cumulated edition information was requested on 173 items, but here any assessment of relevance is confused because some items are duplicated and some requests are also duplicated (*i.e.* the customer has already requested information on this item from an ordinary bulletin and either the information has not yet been received by the library or the information has already been sent to the customer who has mislaid it or forgotten its existence). The total number of requests received (since there are obviously multiple requests for many items) was 2,576 for the twenty-five ordinary bulletins (an average of over 100 per bulletin), and the cumulated edition produced 400 requests of which about a quarter were 'repeat' requests. The total number of requests dealt with in a twelve-month period was not far short of 3,000, or about 12 per day on the assumption of 250 working days in a year.

Problems encountered

The worst problem is summed up by the customer who put his head round the office door waving a copy of the bulletin and said 'Do you realize the first ten future events in this week's issue are now past history?' Time is a constant anxiety. Naturally with a bulletin that comes out only once a fortnight there is an inevitable delay before an item which is noticed early on in the fortnight actually gets into print. In any case, the print room has many other demands on its time besides those from Information Services and bulletins do not always appear on the day intended. Organizers of events do not always give adequate notice—indeed, some organizers of events seem determined that nobody shall ever hear of their meetings or shall hear only too late to attend. Some seem to take a positive pleasure in last-minute cancellations, postponements or changes of date, time, place or subject. An alarming number of organizers of events simply ignore requests for details. Sometimes a telephone call produces information when letters have failed, but at other times telephone numbers given as contacts are unanswered, or are answered only by persons who either cannot or will not help. Some overseas organizations have apparently not heard of the aeroplane, and details are despatched by sea, arriving usually some weeks after the close of the meeting.

Obviously the flow of work is not constant over the year: in 1977 the number of items in the ordinary bulletin varied from thirty to 233, with the consequent variation in work load for the library staff.

Benefits from the bulletin

One obvious benefit is the co-ordination of enquiries about meetings, courses, etc., throughout the Research Division: apart from saving duplication in letter writing, it does mean that for each meeting there is a central list of those interested. In consequence, if a member of staff is interested in a meeting but cannot go to it, he can easily find out who else from the Research Division is likely to be there and could perhaps make notes on particular points for him. The same applies in the not uncommon situation of 'there is one paper in that programme which does interest me, but I do not want to travel all the way to —— just for one paper!'

At one time the bulletin only contained notices of meetings, and there was discussion on whether courses should be included. Finally, it was decided to include a few and see what happened and it was surprising how large the demand for this type of item turned out to be. There has since been a steady and increasing demand for information on courses—all types of courses from the 'two weeks on the Riviera for limited number of participants with at least three years post doctoral experience' to the 'two days in the Midlands for junior technicians'.

Conclusion

The bulletin has been in existence for at least ten years, during which time it has steadily increased in number of items and in demand. Figures available for the last six months of 1973 and of 1977 show an increase in items included of over 100 per cent and in requests of over 175 per cent. It is assumed from these figures that the bulletin serves some need. How many of our customers actually go to meetings, etc., as a result of our labours (and how much enlightenment they receive there), are parameters it is difficult to measure.

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Evaluation of abstract journals and other sources consulted for 75 literature searches on food science and food technology

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For seventy-five literature searches on food science recorded, in forty or more sources consulted (primarily abstract journals and documentation centres) the references were found. The searches were done between 1969 and 1975 and comprised 10,764 references. A breakdown was made for six arbitrarily chosen areas of food science: agriculture, microbiology, chemistry, engineering, processing and products. With the aid of discrimination analysis we determined which of the sources need to be consulted in each area if a reasonable degree of exhaustiveness of coverage is to be achieved (~ 95 per cent of that achieved in our searches). Previous studies indicate the inadequacy of individual sources in food science. Our quantitative study confirms these findings. Of the 10,764 references, as many as 8,737 (81 per cent) were unique to one source. Non-unique references were seldom cited in more than two or three sources. In all, thirty of the forty-odd sources are 'indispensable' for at least one of the six areas. Although the results are influenced to some extent by the field of interest of our laboratory, it was concluded that reliance on just one or two key sources in the food area is unjustified, irrespective of the search topic. The results may help in the development of future search strategies and in the choice of abstract journals for special libraries.

LITERATURE ON FOOD SCIENCE AND TECHNOLOGY is scattered over a great number of secondary journals, indexes and tertiary sources. Anyone whose task it is to collect, compile and review the literature is faced with a multitude of literature sources of differing value. In the absence of data on the relative merits of each source, one is obliged to consult as many as possible in order to reduce the risk of missing key references.

Abstract journals and bibliographies are the major information sources. According to Knower,[1] an ideal abstracting journal:

—covers the field completely,
—publishes good annual and collective indexes,
—maintains high quality in abstracts,
—keeps the service prompt.

Confronted with the problems of compiling comprehensive bibliographies and literature surveys on food science, food technology and borderline areas, it was decided to investigate the value of sources which were known and which were available. The evaluation was started in 1969. For each literature survey, records were kept of the sources (and the year of issue) in which each of the relevant references was found. The ultimate aim was to determine which sources had to be consulted for a reasonably exhaustive coverage and hence to develop search strategies for future literature surveying.

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Previous evaluation of abstract journals

Borgstrom[2,3] found that a significant portion of publications on food science was never made available through abstracting or indexing services and complained about the scattering of information in food science. After analysing eight bibliographies with 1,795 references in this field, he concluded that a lot of the references were not traced in the following key sources: *Chemical Abstracts*, *Biological Abstracts* and *Nutrition Abstracts and Reviews*. For the area of food manufacture and technology few references were found, while microbiology turned out to be a 'no man's land'. Thus, as early as 1964, the inadequacy of coverage of these sources for food science was demonstrated.

In 1964, Martyn and Slater[4] presented an analysis of twelve bibliographies in the fields of chemistry, biology, agriculture, physics and information science, with a total of 1,634 references. They looked for these in twenty-eight English-language abstract journals and found that: 27 per cent were not covered at all, 27 per cent were covered only once and 46 per cent were covered more than once.

In 1970 Martyn[5] again tested twenty bibliographies, including the twelve of those from 1964. In total he looked for 3,093 references in thirty-seven different English-language sources. Of these references, 21 per cent were not covered at all, 27 per cent were covered only once and 52 per cent were covered more than once.

Dannatt[6] criticized the reliability of Martyn and Slaters' test, while Bost[7] commented on the number of abstract journals consulted by the testers. Bost concluded that the results indicated a lack of coverage of abstract journals by the testers, rather than a lack of coverage of the literature by abstract journals taken collectively!

Simon[8] analysed a part of Martyn's test[5]—a bibliography on bio-control of insects and weeds—particularly with regard to the coverage of countries (languages) and the period of time covered. He found that 85 per cent of the references were to original articles in English and only 5 per cent to articles in French and 5 per cent to articles in German. A clear demonstration of language 'blindness', a common failing in bibliographies.

Bourne[9,10] thoroughly studied the coverage of the *Bibliography of Agriculture* in 1967, relative to that of fifteen other secondary sources. A total of 5,101 *Bibliography of Agriculture* citations (that is 5.4 per cent of 1967 publications: a uniform random sample) were searched for in each of the fifteen other services. It was found that:

—54 per cent of the citations were not covered by any of the other fifteen services,
—24 per cent were covered by only one other service,
—no citation was covered by more than six other services,
—approximately 61 per cent of the journals screened for *Bibliography of Agriculture* were not covered by any of the other services,
—17.8 per cent of the journals were covered by one other service.

No single service covered more than 20 per cent of *Bibliography of Agriculture* citations. The highest scorers were *Biological Abstracts* (18.7 per cent), *Chemical*

Abstracts (12.1 per cent), *Dairy Science Abstracts* (1.4 per cent), *Engineering Index* (0.6 per cent), *Index Medicus* (6.2 per cent) and *Horticultural Abstracts* (4.2 per cent).

Of the sample citations from the Food and Human Nutrition Section 72 per cent were not covered by any of the services studied. Bourne[10] concluded that the *Bibliography of Agriculture* covered 48–51 per cent of the literature relevant to the interests of agriculture researchers, be it less promptly than most of the other fifteen services.

Analysis of the literature searches

Records were kept of the sources in which each reference was found for all seventy-five literature searches. However, some words of caution will not be out of place:

(i) Not all of the sources considered were consulted for all searches; on the other hand, no sources were excluded which, on the basis of experience with previous searches, could be expected to make a contribution;

(ii) The period covered for each literature survey was not always the same; moreover, for a particular search it was not always possible to consult the various sources over the same period (*e.g.*, publication of *Food Science and Technology Abstracts* did not begin until 1969).

Literature references found only in one source have been referred to as unique citations (*i.e.* unique to a particular source). Other literature references were found in two or more sources. Thus, a single reference corresponds to two or more citations. A citation is a literature reference found in an abstract journal or in another source.

AREA	Number of searches	Total number of refs (R)	Subjects
Products	30	4,711	Composition, organolepsis, nutrition
(Micro)biology	5	525	Properties, actions of micro-organisms
Chemistry and physics	8	702	Analyses; physical and chemical properties
Engineering and machinery	8	1,230	Apparatus and machines
Agriculture	4	794	Cultivation and harvest
Processing	20	2,802	Drying, homogenizing, cooking, canning, frying, freezing, milling, etc.
TOTAL	75	10,764	

TABLE 1: *Breakdown of searches evaluated for each main area of food science*

Since we were particularly interested in the value of individual sources, we recorded after each literature search the following parameters:

R = total number of references,

C_t = total number of citations per source,

C_u = number of unique citations per source,
$C_n = C_t - C_u$ = number of non-unique citations per source,
V = number of volumes searched per source (for the sake of compatibility this was taken as the number of twelve-month periods over which the source was searched, irrespective of the volume numbering).

SOURCE	C_t	C_u	C_n	AA	BA	CA	FSTA	HA	
Analytical Abstracts	22	9	13	$\boxed{9}$	5	5	2	5	etc.
Biological Abstracts	295	117	178	5	$\boxed{117}$	100	21	37	
Chemical Abstracts	1040	574	466	5	100	$\boxed{574}$	74	110	
Food Sci. Techn. Abstracts	743	397	346	2	21	74	$\boxed{397}$	33	
Horticultural Abstracts	566	315	251	5	37	110	33	315	
etc.									

TABLE 2: *Origin of references for 30 searches in the products area (a fragment)*

The data were cumulated over all searches and the six areas of food science and recorded in the form of tables in which the rows (and columns) correspond to the individual sources. The diagonal in Table 2 represents unique citations. The data for a particular source could be read off from the corresponding row of the table; if a non-unique citation in this source is also found in other sources then entries are found in the column corresponding to these sources in the Table. A Venn diagram in Figure 1 may also help to clarify. In this diagram we present the overlap for three sources used in the area of food products. In all we consulted twenty-six sources for that area.

The extent of overlap between the sources was determined by summing the rows in the tables. A non-unique citation found in one additional source (*i.e.* two in all) was entered once in the corresponding table row, a non-unique citation found in two additional sources (*i.e.* three in all) was entered twice in the row,.and so on. Thus, if C_1 = the number of citations common to one additional source, C_2 = the number of citations common to two additional sources, we can write:

$$\Sigma_r \text{ (sum of table row)} = C_u + C_1 + 2C_2 + 3C_3 + 4C_4$$
$$\Sigma_r - C_u = C_n + 2C_2 + 3C_3 + 4C_4$$

By definition:

$$C_t = C_u + C_1 + C_2 + C_3 + C_4$$
$$C_t - C_u = C_n = C_1 + C_2 + C_3 + C_4$$

To determine the value of 'uniqueness' of the various sources we used a parameter N, the overlap number:

$$N = 1 + \frac{\Sigma_r - C_u}{C_t - C_u} = 1 + \frac{\Sigma_r - C_u}{C_n}$$

In this way, N is a measure for a particular source of the frequency with which non-unique citations are found in other sources. Thus if all non-unique citations

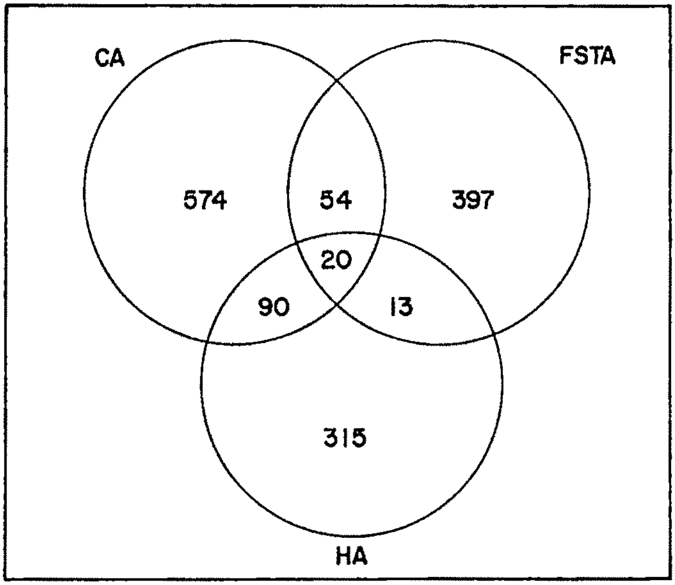

FIG. 1: *Venn diagram for three main sources in the food product area, namely* Chemical Abstracts (*CA*), Food Science & Technology Abstracts (*FSTA*) *and* Horticultural Abstracts (*HA*). *Figures indicate number of references*; (e.g. *574 unique to CA, 54 in CA and FSTA, 20 in CA, FSTA and HA*

are found in just one additional source (C_2, C_3, etc. = 0), $N = 2$. Similarly, if all non-unique citations are found in two additional sources, $N = 3$. A low overlap number is an indication of the 'uniqueness' of a source.

Discrimination analysis

An objective basis of comparison was required for the contribution to the literature searches of the sources consulted. The contribution of new sources and sources used less often is low, if the number of volumes consulted is not taken into account. On the other hand, dividing C_t (total citations per source) by the number of volumes consulted gives rise to over-compensation since no allowance is made for the total contribution of the source. We therefore looked for a more meaningful means of correction for the number of volumes (V). It was found that a more or less linear relationship existed between the number of unique citations for a particular source, C_u (which itself is an indication of the value of a source), and the factor $C_t/\log_n V$ or C_t/V^*. This turned out to be a useful discrimination factor.

For each of the six areas of food science considered, abstract journals were listed in descending order of C_t/V^* until 95 per cent of the unique citations in our searches had been covered. Documentation files of institutes contribute to unique citations, but the factor C_t/V cannot be applied to them: they were therefore listed separately but their contribution to unique citations was summed and included with those of the journals.

This approach enabled us to identify which sources are most important for searches in each of the six areas considered and, also, for the field of food science in general.

This approach gave rise to so called corrected tables for each of the six areas, composed from corrected values of C_u, C_n, N and

$$U\left(\frac{C_u}{\Sigma C_t}\,100\right),$$

which are designated as C_u (corr.), C_n (corr.), etc. See, for examples, Table 3 and Table 4.

The results of the discrimination analysis showed that a relatively large number of sources have to be consulted to achieve a tolerable degree of exhaustiveness. It should be stressed that our literature searches were not themselves exhaustive. Had they been the findings might have been even more discouraging to those relying on only a few sources. In most areas the degree of overlap between the sources is small.

Evaluation of individual sources

Table 4 lists the most important sources for each of the six areas. A ranking order of importance (based on the number of unique citations after discrimination) is given for each source, together with the corrected U values.

Thirty sources remained after discrimination analysis. Only two of these (FSTA† and bibliographies‡) have to be consulted in all six areas; two others (BF and Bibliography of Agriculture) are important in five areas, and another two in four areas.

Of the two sources important in all areas, it is evident that special subject bibliographies‡ give a high quota of unique citations. The only exception is in the area of Engineering, where there is a scarcity of good bibliographies. The total contribution to the number of citations before correction (*i.e.* $C_t/\Sigma C_t$) was

SOURCE	Corrected data				C_t/V^*	N
	C_t	C_u	C_n	$\Sigma_r{}^-C_n$		
Biological Abstracts	295	129	166	346	60.23	3.08
Chemical Abstracts	1,040	602	438	738	185.77	2.68
Food Sci. Techn. Abstracts	743	436	307	502	172.63	2.64
Horticultural Abstracts	566	338	228	463	110.21	3.03
etc.						

TABLE 3: *Origin of references for thirty searches in the Product area after discrimination analysis (a fragment)*

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† For the explanation of abbreviations see Table 5.

‡ Obtainable in special libraries of many different Dutch institutes, *e.g.* in Wageningen and not found via abstract journal indexes.

SOURCE	Number of areas in which the source was ranked	Contributions to total citations (before correction) (%)	Products $C_t/V^* > 25$			Microbiology $C_t/V^* > 5$		
			Ranking order	% U (corr.)	N (corr.)	Ranking order	% U (corr.)	N (corr.)
FSTA	6	10.28	3	7.3	2.64	11	2.4	3.00
BIBL	6	9.8	2	7.5	3.10	4	9.8	2.00
BF	5	8.13	6	5.2	3.08	6	6.2	2.50
BAG	5	7.10	7	4.9	3.04	1	11.6	2.38
CA	4	14.06	1	10.0	2.68	2	10.7	2.04
CZ	4	2.69	13	1.2	3.45	7	4.9	2.00
GIESS	3	5.72	4	6.0	2.79	12	0.7	1.00
HA	3	5.37	5	5.6	3.03	9	3.3	2.50
BERL	3	3.66	8	2.9	3.40	—	—	—
BA	3	3.36	9	2.2	3.08	3	10.0	2.91
ZLUF	3	3.02	10	2.0	3.23	8	3.5	4.00
FSA	3	2.61	12	1.5	4.06	—	—	—
VDMA	3	2.13	—	—	—	—	—	—
SPREN	3	1.74	11	2.0	4.38	—	—	—
EI	3	1.56	—	—	—	—	—	—
PA	2	5.61	—	—	—	—	—	—
JSFA	2	1.96	14	0.9	3.19	—	—	—
N&E	2	0.80	15	0.47	2.96	—	—	—
DSA	1	2.00	—	—	—	—	—	—
LH	1	0.97	—	—	—	—	—	—
IV	1	0.86	—	—	—	—	—	—
CONFRU	1	0.78	—	—	—	—	—	—
AA	1	0.57	—	—	—	—	—	—
VTB	1	0.52	—	—	—	—	—	—
IM	1	0.43	—	—	—	5	6.2	2.00
ASTI	1	0.27	—	—	—	—	—	—
PHYSA	1	0.20	—	—	—	—	—	—
ICEA	1	0.19	—	—	—	—	—	—
BULL S	1	0.16	—	—	—	10	2.3	2.63
BPI	1	0.10	—	—	—	—	—	—

TABLE 4: *Importance of sources in the six areas of food science, their ranking order, corrected overlap numbers (N corr.) and unique citations as a percentage of the total citations (U corr.).*

9.8 per cent. The other source to score in all areas was *Food Science and Technology Abstracts*, despite its relatively short existence. In all, it contributed 10.3 per cent of all citations in the six areas. It is clear that this source is becoming important, although it has by no means made the other important sources superfluous as yet.

The *Bibliography of Agriculture* and the *British Food Manufacturing Industries Research Association Abstracts* (now called *Food RA Abstracts*) proved to be important sources in five areas. They contributed 7.1 and 8.2 per cent, respectively of all citations.

Chemical Abstracts and *Chemisches Zentralblatt* were important in four areas, namely all except Agriculture and Engineering. *Chemical Abstracts* contributed more citations than any other single source, namely 14.1 per cent, and was ranked first in the areas Products and Chemistry and Physics and second in the area Microbiology. *Chemisches Zentralblatt* contributed only 2.8 per cent of all citations.

Chemistry & Physics $C_t/V^* > 8$			Engineering & Machinery $C_t/V^* > 10$			Agriculture $C_t/V^* > 10$			Processing $C_t/V^* > 15$		
Ranking order	% U (corr)	N (corr.)	Ranking order	% U (corr.)	N (corr.)	Ranking order	% U (corr.)	N (corr.)	Ranking order	% U (corr.)	N (corr.)
10	0 8	2.00	2	12.3	2.05	9	0.7	2.00	2	11.1	2.40
2	12.8	10.57	8	1.7	3 00	1	23.4	2.00	1	12.1	3 20
7	1 9	4.16	5	7.3	2.32	—	—	—	3	8.1	2 32
3	3.6	3.78	—	—	—	2	17 4	2 28	8	3 7	2 47
1	42.5	3.00	—	—	—	—	—	—	4	7 3	2 27
8	1.4	2.61	—	—	—	—	—	—	10	2.7	2.42
—	—	—	—	—	—	—	—	—	5	4 7	2.43
—	—	—	—	—	—	3	12 2	2 73	—	—	—
—	—	—	9	1 6	2.00	—	—	—	15	1.0	2.96
5	2 9	2 63	—	—	—	—	—	—	—	—	—
—	—	—		—	—	—	—	—	12	2.2	2.67
—	—	—	—	—	—	7	4.2	2 20	9	3.8	2.64
—	—	—	3	8 0	2 30	4	10.0	2.09	14	1 4	2.55
—	—	—	—	—	—	5	5.4	2.00	16	0.7	3.00
9	1.0	2 50	—	—	—	8	3 5	2.11	11	2.5	2 39
—	—	—	1	42 9	2.06	—	—	—	7	4.1	2.84
6	2.4	4.55	—	—	—	—	—	—	—	—	—
—	—	—	6	3 7	2.00	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	6	4.1	2 39
—	—	—	—	—	—	6	4.4	2.14	—	—	—
—	—	—	4	8.0	2.64	—	—	—	—	—	—
—	—	—	7	2 1	2 00	—	—	—	—	—	—
4	3 5	3 44	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	13	1.6	3 06
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	10	0.55	2 00	—	—	—	—	—	—
11	0 1	2.00	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	17	0.5	3.73
—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	11	0.4	2 50	—	—	—	—	—	—

The following sources are important in three of the areas (in parentheses their contribution in total citations): *Biological Abstracts* (3.4 per cent), *Engineering Index* (1.6 per cent), *Food Science Abstracts* (2.6 per cent), *Horticultural Abstracts* (3.3 per cent), *Zeitschrift für Lebensmitteluntersuchung und -Forschung* (3.0 per cent) and the documentation files of the institutes at Berlin (2.7 per cent), Giessen (5.7 per cent), of the Sprenger Institute (1.8 per cent) at Wageningen, and of the VDMA (2.1 per cent) at Düsseldorf (now DOMA at Frankfurt/M).

Three sources were important in two areas, namely the *Journal of the Science of Food & Agriculture* (1.9 per cent), the new East German abstract journal *Nahrung & Ernährung des Menschen* (0.8 per cent) and *Packaging Abstracts* (5.6 per cent) which was ranked first in the area Engineering and Machinery. *Nahrung und Ernährung des Menschen* is actually still too new to be judged properly: it may well prove to become more important, and this will be checked carefully in future.

The other twelve sources were important in only one of the six areas, mainly due to fringe overlap between the area in question and the subject matter of the source. Nevertheless they contributed some 7 per cent of the total citations and about 6.5 per cent of the unique ones.

ABBREVIATION	NAME
AA	Analytical Abstracts
ASTI	Applied Science and Technology Index
BA	Biological Abstracts
BAG	Bibliography of Agriculture
BERL	Zentralinstitut fur Ernährung, Wissenschaftliche Informationsdienst in Potsdam-Rehbrücke (East Berlin)
BF	British Food Manufacture Industries Research Association Abstracts
BIBL	Bibliographies
BPI	Business Periodical Index
BULL S	Bulletin Signalétique
CA	Chemical Abstracts
CONFRU	Confructa, Bibliographie
CZ	Chemisches Zentralblatt
DSA	Dairy Science Abstracts
EI	Engineering Index
FCA	Field Crop Abstracts
FSA	Food Science Abstracts
FSTA	Food Science and Technology Abstracts
GIESS	Institut für Ernahrungswissenschaft I, Dokumentation in Giessen (West Germany)
HA	Horticultural Abstracts
IM	Index Medicus
IV	Informationsdienst Verpackung
JSFA	Journal of Science of Food and Agriculture
LH	Landbouwdokumentatie (Wageningen, Holland)
N&E	Nahrung und Ernährung des Menschen (series of nine abstract journals)
PA	Packaging Abstracts
PHYSA	Physics Abstracts
SPREN	Sprenger Instituut (Wageningen, Holland)
TCEA	Theoretical Chemical Engineering Abstracts
VDMA	Verein Deutscher Maschinenbau-Anstalten, Dokumentation
VTB	Verfahrenstechnische Berichte
ZLUF	Zeitschrift fur Lebensmitteluntersuchung und Forschung

TABLE 5: *Abbreviations of source names*

In the various areas the number of sources to be consulted diminished largely after discrimination analysis in order to obtain 95 per cent of unique references. It was found that for the Product area 15 (26) sources were needed, for (Micro)-biology 12 (20), for Chemistry and Physics 11 (17), for Engineering and Machinery 11 (15), Agriculture 9 (15) and Processing 17 (34). The numbers in parentheses give the number of used sources before discrimination analysis.

Discussion

The most striking finding is the very high number of citations unique to one source. Of the 10,764 references in the seventy-five literature searches, as many as 8,737 (or 81 per cent) were cited uniquely in one of the sources.

The total number of citations, unique and non-unique, was 13,653. Thus, it can be concluded that the non-unique citations were seldom found in more than two or three sources; a total of 10,764 − 8,737 = 2,027 references (or 19 per cent) were cited 13,653 − 8,737 = 4,916 times, or an average 2.42 times per reference. This ties up with the overlap numbers for the individual sources, most of which were in the range 2.0–4.0. For some areas, *e.g.* Microbiology, Engineering and Agriculture, the overlap numbers were nearly all less than 3. Overlap between sources tended to be slightly higher in the other areas. It should be stressed that the overlap number as defined for this study does not take into account the large number of unique citations, but is based entirely on non-unique citations.

Note

Tables with details on the origin of references for searches in six areas, before and after discrimination analyses, a table with details on the time lag for thirty sources, and six figures, showing contributions of individual sources in order of importance to the unique citations in different areas are available from the authors (Unilever Research Duiven, PO Box 7, Zevenaar, Netherlands).

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BRIEF REVIEWS

BURKETT, J., RITCHIE, S. *and* STANDLEY, A. Library practice: a manual and textbook. Huntingdon, ELM, 1977. 293 pp. £4.90. (ISBN 0 9505828 0 8.)

This is described as a book to fill the gap 'between the general introduction and the specialized monograph', with the emphasis on practice. This seems a very useful book even as a general introduction, having eleven sections. First of all introducing libraries and then covering: users and their needs; library staff; stock; physical planning; computers in the library; external resources; professional associations and library services. Each section is prefaced with a contents page setting out the areas to be covered. The computer section is particularly welcome as there is a shortage of basic texts for this area. The end of each section has a short bibliography with a high proportion of recent references. In general the text is made up of short paragraphs which make the book less daunting than some other basic books. There is a short glossary at the end. It is unfortunate that such a useful book should have very poor binding.

KATZEN, MAY. The visual impact of scholarly journal articles. Leicester, Primary Communications Research Centre, 1977. 99 pp. (ISBN 0 906083 02 8.)

This is a 'report of a feasibility study to isolate the factors which may govern the impact of research articles on readers and to outline a methodology for their determination'. (Page 1 of this report is a good example of its subject: the show-through from the other side of the page fits neatly between the lines of print on the first page.) The report examines methodologies used in cognate fields and assesses their suitability for the study of research articles. Visual impact can be varied by: physical medium; design; verbal style; mathematical and graphical presentations. The study of visual impact must include the study of the relationship between reader and text and therefore take notice of the processes of reading and comprehension and methods of assessment of these things. There should also be some identification of the reader, her/his subject knowledge, motive in reading and reading strategies. The last chapter outlines the feasibility of a research project on the impact of journal articles and proposes a methodology for studying the the efficacy of different presentations. There is a nineteen-page bibliography divided into sections broadly following the movement of the text.

TEGA, V. G. Management and economics journals: a guide to information sources. Management Information Guide 33. Detroit, Michigan, Gale Research Co. 1977. 370 pp. (ISBN 0 8103 08339.)

This guide contains a useful collection of information about management and economics journals. The 161 journals selected by the compiler are mainly North American, however 'core' journals from England, France and other European countries are also listed. A statement of editorial policy is given for each journal, together with details of publisher, circulation, advertising rates and other

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features where available. 'Special issues' are detailed and indexed and indication is given of which journals list relevant dissertations or research. Additional information in each entry covers the availability of reprints, indexes appearing in the journal and indexing and abstracting sources which include the publication regularly. Although it is not stated whether information on topics such as acceptance rate, and reasons for rejection, of submitted manuscripts, is provided by the publisher, it may be of interest to aspiring authors. It is not made clear at whom this publication is directed. Any organization wishing to inspect a copy whilst considering purchase may do so at the Information Department at Aslib.

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INFORMATION FOR BUSINESS: PROBLEMS OF AVAILABILITY AND ACCESS

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Business information: a review of user difficulties

Judith Collins

Aslib Consultancy Service

The author presents the results of a dipstick questionnaire survey of the Aslib UK members which was designed to establish in which areas of business information provision, users perceived difficulties. Consideration is then given to the differentiation between difficulties on the part of the information seeker and difficulties inherent in the information being sought. It is suggested that the information seeker can be prone to three problems, (1) isolation, (2) the need to respond quickly and (3) lack of training.

Paper presented at an Aslib conference on Information for business: problems of availability and access, held at the Geological Society of London, 5 December 1977

Introduction

THE MATERIAL PREPARED comes neatly under two headings. Firstly, the results of the dipstick questionnaire survey on problems in handling business information conducted in the summer of 1977, and secondly the areas where the respondents to that questionnaire perceive difficulties. Attention should be focused on whether the difficulties identified are actual difficulties on the part of the information seeker or whether they are inherent in the type of information being sought. I have had some thoughts on this but regard my contribution as an attempt to provoke discussion rather than giving an authoritative state-of-the-art review.

The questionnaire survey

When this conference was being planned, all the members of the planning committee knew that they as individual practitioners had problems in handling business and commercial information. As ideas for this conference were discussed further, it was realized that no one practitioner's experience could adequately reflect the complexity of the problems. Therefore, in order to try to broaden the basis of experience in the management of business information, I undertook to conduct a survey. Ideally I would have liked to have mounted a full research project into this area, to have interviewed practitioners, got them to keep diaries and to have put the full weight of a thorough research programme behind this. Well, neither the time nor the money was available for research, so it was decided to do a quick dipstick survey by means of a simple questionnaire. The questionnaire was drawn up with the help of colleagues in the Aslib Research Department, and 900 copies were sent out in a routine mailing to the Aslib UK membership. By the end of September, 147 usable replies were received, a response rate of 15 per cent. This response rate was not exciting but

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in fact it is about average for this type of survey and rather better than average considering the vehicle that was used and that it was not possible to do a follow-up.

Question 1

The questionnaire addressed itself to anyone handling and using business information, and the first question asked how much of the respondent's time was spent dealing with this sort of information. Half the respondents categorized themselves as spending *some* time dealing with this sort of information, a quarter spent *most* of their time and 20 per cent spent *all* their time in dealing with business information. These figures by themselves meant next to nothing but (a) they were needed to be certain that the questionnaire had got to the target respondents, and (b) to relate them to the answers to the later questions and to those problems perceived by the respondents.

Question 2

The second question presented the respondent with six main areas of business information, and asked, 'Do you have difficulty in getting information in any particular area or areas?' The affirmative results are presented in Table 1.

	UK	FOREIGN
	%	%
Company financial information	19	58
Other company information	33	61
Products and services	23	48
Production/Distribution	37	43
Trade	20	33
Markets	37	48

TABLE 1: *Percentage of respondents having difficulty in getting different types of business information*

It is surely no surprise to anyone that more people have more problems with foreign information than they do with UK information, but that fact is probably worth restating. Many respondents appear to have difficulty in obtaining information about foreign companies, be it financial information or other information such as addresses or names of directors. There are two other areas where nearly half of the respondents admitted to having difficulty, namely information about foreign products and services, and information about foreign markets. As far as UK information is concerned, it seems that markets and production/distribution information have the most problems attached.

To a large extent this picture confirms my own experience as a practitioner, although the figure of 37 per cent for UK production/distribution information is higher than I would have predicted. Perhaps this is related to the periodicity of publication of the *Census of Production* or to the lack of exhaustive detail in the *Business Monitor* series.

Question 3

The third question in the survey was in the form of a grid, and demanded some considerable effort from the respondents. A number of people chose not to complete this question and the results shown in Table 2 are presented as percentages of respondents who did complete it. This question was designed to ignore the type of information being sought but to concentrate instead on the source in which the information was made publicly available. The question went even further, in that it asked respondents to differentiate between problems of identifying the source of the information, getting access to it and using it. In other words, this time practitioners were not asked to indicate their problems with, for example, Japanese steel production figures, but rather whether they had difficulty identifying the publication containing those statistics, then getting access to that publication, and lastly whether they had problems using that publication once they had got their hands on it.

Some thirteen different types of source were listed, but Table 2 includes only those sources with which practitioners have the most problems.

	IDENTIFYING	GETTING ACCESS TO	USING
	%	%	%
Directories	10	10	10
Company information services	16	22	5
Company annual reports	1	21	8
Trade literature	14	16	4
Compilations of statistics	24	19	10
Market research reports	30	48	3
Official publications	17	16	6
Newspapers	0.7	14	4
Computerized data bases	15	17	8

TABLE 2: *Percentage of respondents having difficulty in identifying, getting access to and using various information sources*

This table shows clearly that in business information the source most frequently causing problems to practitioners is the market research report, with 30 per cent of respondents having difficulty in identifying and 48 per cent of respondents admitting problems in getting access to them. The second most problematic source concerns compilations of statistics. Because these two types of source did get such a high rating, the results have been looked at further and have been related to the responses to Question 1, 'How much time do you spend dealing with business information?' The following inferences do not bear any statistical validity because the sample was so small, but from this dipstick survey it appears that if all or most of a practitioner's time is spent on commercial information work, then fewer problems will be encountered in getting access to market research reports than if only some of the practitioner's time is spent in commercial information work. It may be that this simply indicates that tenacity wins, but when the figures for compilations of statistics are compared it seems that no matter how much time is spent in commercial information work, there is the same degree of problem. I suspect that these statements indicate that there is a qualitative difference in encountered problems, and therefore further research into this would be fruitful.

Question 4

The fourth question related to the grid, and it asked respondents to give reasons for their difficulties in any one of the areas they had identified as a problem. Not surprisingly, quite a lot of the respondents chose to expand on market research reports. The reasons for problems in handling this type of information source ranged widely, from the innocent 'We find it difficult to obtain copies of our competitor's marketing plans', through to the more sophisticated comments such as, 'Market research reports are usually so badly done that they aren't worth reading anyway'. Within this innocent–sophisticated spectrum, though, there were two obvious peaks. A general complaint was that the reports were too expensive for the library or information unit to buy, and this was coupled with the absence, in this country, of a complete or even substantial collection of market research reports for either reference or loan. A lot of people thought that the British Library Lending Division should have a role to play in overcoming this problem.

Some other topics were chosen by the respondents for comment about the reasons behind their problems; of these, two topics stood out, in that they were each mentioned by more than twenty people. The first topic concerned trade literature. The reasons for problems with this type of material were seen to be lack of bibliographic control and a general lack of interest by the producers of the literature in sending out new editions, that is to say, keeping the recipients up to date. The second topic dealt with directories, and the reasons for complaint here were specifically the poor standard of indexing of many directories, and their expense.

Responsibilities of the information seeker

At the beginning of this presentation I suggested that we should focus our attention on whether the difficulties identified in the questionnaire survey are real difficulties on the part of the information seeker, or whether they are inherent in the type of information being sought. My reflections on this have been concentrated on the former, and in my understanding there are three problem areas which are to do with the information seeker. These are location, speed, and training.

1. Considering 'location' first, I would like to quote to you some of the questionnaire responses. The first was from Liverpool.

> 'The main reason for our difficulties is distance from the main collections. The only comprehensive newspaper collection is over 200 miles away and this also applies to trade literature and official publications.'

Or again from Newcastle:

> 'We have a severe local problem in the North-East—no business library freely available and no public or other authority adequately provided with this type of information.'

And from Whitehaven, referring to company information services:

> 'These are mostly located in London or large regional libraries. My library is approximately 100 miles from the nearest reasonable sized economics library.'

What is of the utmost importance is the fact that these respondents are hampered in their job performance because they feel isolated. Further, it is hoped that these quotes have given some idea of the dimension of the problem of the business information seeker who is based outside the golden circles around London, Birmingham and Manchester.

2. The second group of problems for the information seeker, comes under the heading of 'speed', or maybe 'time' would be a better word. It is part of the conventional wisdom that when a businessman asks for information he does not want the answer today, he wants it yesterday. So the information officer or librarian who has to respond to this demand is usually working under time pressure. This time pressure can, of course, be a source of job satisfaction and it is suggested that for a lot of us it is just that, but further, some demands for speed of answer are unreasonable and reflect more on the organizational climate than on any real need. Whenever practitioners rush around unnecessarily in response to a pseudo-urgent request, they damage the professional image of the information worker; it is part of our role to assess the actual degree of urgency.

3. The third heading here is training, and I suggest that the training available to recruits into business information work is inadequate, and that is despite the efforts of the library and information science schools, the Library Association and Aslib. Most practitioners in business information have had to learn skills either by being lucky enough to work with an expert librarian who could teach the job, or by stumbling across information sources. If accurate and timely information for business is at all important, then these traditional informal learning techniques are definitely inadequate.

Conclusion

To sum up, the survey gave some preliminary indications of the problems encountered by some of the UK Aslib membership in the handling of business information. It would seem that there is no one area of business information that is problem-free. It would seem too that some problems are worse than others *e.g.* market research reports and statistics. However, practitioners have to take some responsibility and I suggest that the worst of all possible roles to take in this world of business information is to be an untrained information officer working with market research reports, in a hurry, in the North-East!

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Government statistical information

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THIS PAPER IS limited to the subject of government statistics, which is far from typical of the problems attached to the preparation and marketing of commercial services. However, the Government Statistical Service is probably the most important single source of primary information and it is vital that the Service be explained. The theme for discussion is to what extent users get the service they expect and to what extent their expectations are too low.

Relatively few people do understand the way in which statistical compilation and publication is organized and unless one makes this clear to start with and points out the limitations that this imposes, it is impossible to discuss sensibly what the Service does and can hope to do.

Organization of the Government Statistical Service

There are about 6,500 people in what is loosely described as the Government Statistical Service, about 500 of whom are professional statisticians. There are other specialist staff such as social survey officers and computer operators but most of the non-statistical staff are generalists and they vary from a limited number doing more or less the same jobs as the professional statisticians, to very large numbers carrying out routine collection functions such as the sorting and coding of the overseas trade statistics.

Organizationally it is highly decentralized by international standards. This means in effect that each ministry has statistical staff on its payroll who are concerned with producing and interpreting the statistical information necessary for the policies of that department. In addition there are several large, almost entirely statistics-collecting offices—the Business Statistics Office at Newport which is intended to collect most of the statistics from business that are required by the Government Statistical Service, the Customs Statistical Office at Southend which collects the overseas trade figures for the Department of Trade and the Office of Population Censuses and Surveys which is responsible for compiling most of the household and personal statistics on behalf of other departments.

The Central Statistical Office is a part of the Cabinet Office. It was created towards the end of 1940 by Winston Churchill who was not only fed up with people worrying about split infinitives but also with getting inconsistent statistical briefs from different departments. The CSO then as now was charged with co-ordinating the statistical system, ensuring that standards, classifications

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etc. were consistent throughout. During the last ten years, since the Report of the House of Commons Estimates Committee, the CSO has adopted a much stronger co-ordinating role. However, it should be clearly noted that, with few exceptions, the CSO has no powers to direct the other parts of the system in what they can and can not do.

The CSO is also responsible for producing the major economic syntheses—the national accounts, balance of payments, financial flows, input–output statistics etc. Its publication programme encompasses both its service-wide co-ordinating function—insofar as it produces various digests, abstracts and so on—and also the publication of its own statistics in things like the *National Income and Expenditure Blue Book*.

A decentralized system is maintained in order to give top priority to effective use within government and it is only by having statisticians working very closely with the policy administrators that maximum efficacy is ensured in this respect.

But the fact is that it is *not* well suited for serving outside users. There are a number of reasons for this. They include the question of identity. In a country like the Netherlands any interested person will know that the Central Bureau of Statistics is the place to go for government statistical information; it is not quite so easy when you have upwards of twenty possible departments to choose from. Similarly that same Dutch office is literally open to the public. Everything it produces is, if technically suitable, made public and it can be bought or collected direct from the CBS building. There is the question too of orientation. Inevitably in our type of system the statistician will be looking very much in the direction of the administrators he is serving and will have inevitably to give second best consideration to outside inquirers. This touches on the whole question of priorities. Without an overall system of priorities it is very difficult to see how one can organize a statistical service so that it will devote x or y per cent of its time to serving the public or will do this or that bit of analysis because there is a public as opposed to a government need for it. The fragmentation of resources again makes it more difficult to concentrate enough people full time on helping outside users. In France (which admittedly is an extreme case) the Central Statistical Office has 650 people concerned wholly with dissemination work. The Central Statistical Office in London has only 250 people in total. The nature of the system means that publications will by and large follow the responsibilities of the individual departments. Thus if you wish to find some particular employment series you will probably have to look out the appropriate issue of the *Department of Employed Gazette*. This is not in the end crucial but it may be a major deterrent to a new user and certainly librarians would prefer to have a co-ordinated set of statistical publications. The fragmentation incidentally also means that the CSO cannot control the marketing of its own publications as is the case in all of the big centralized offices. This is all done through HMSO. There is therefore a very good statistical service for government but one which imposes some constraints on the service which can be offered to others.

Two major external constraints prevail. In some cases government statisticians do little more than act as brokers between what one side of industry would like the GSS to collect and what the other side is prepared to give in its statistical returns. And this leads on to the second external constraint which is the question of confidentiality. Very rigorous assurances are given that no information which will reveal either directly or indirectly identifiable information about a company or individual will be published. This often prevents the giving of figures in as disaggregated a form as users would like them. And a major division of opinion arises on the question of publishing registers of respondents by industry, size, group etc. Many commercial users—particularly market researchers—implore the CSO to make these full lists available. But other representatives of industry are equally adamant that they shall not be made available, and for many years there has been an impasse on this issue.

Government Statistical Service dissemination policy

First, the basic policy is to publish all primary information subject only to technical suitability, the confidentiality constraints mentioned and ultimately the resources. The aim is to see that information used as widely as possible. Primary information is emphasized because there is no doubt that there are little bits of special analysis that are done within departments and which never see the light of day. But the great mass of information produced is there to be used by everybody as far as the GSS is successful in putting it out in a form that can be used. And with very few exceptions the pricing policy is to charge only for the cost of making information available.

Motives are a mixture of philanthropy and self interest. On the one hand it is believed that the greatest possible returns for all the money that has gone into the compilation of these statistics by getting them used as widely as possible should be ensured; that society will be the better for fully informed discussion of issues and that industry will benefit from access to a wide range of inexpensive data. On the other hand it is hoped that people will see this information as useful and, even more so, use it themselves, and will be a little less reluctant to fill in statistical returns and a little more understanding about the problems of producing this sort of information.

Performance

It is convenient to divide this topic in some way and my classifications are: two-way communications with regular statistics users, quantity of published information, publicizing the existence of what is available, guiding users to the correct sources and, finally, helping people make use of the information.

By two-way communication is meant both taking reasonable steps to let users know what is happening and actively seeking their views on what they need and what should be done to help them. To ensure the first of these, *Statistical News* was started in May 1968. There is also a mailing list with over 20,000 names of people who receive details about new publications, copies of new leaflets etc. In terms of receiving the views of users, the record is more patchy. There are some excellent achievements to boast of, notably the development of the new system of industrial statistics which was done entirely in consultation with trade associations and which now provides sales figures in respect of some 4,000 commodity headings. The GSS has contributed greatly to the development of the annual Statistics Users' Conferences which take a different theme each year and give specialist audiences a chance to air their grievances and say what they want. A survey was carried out with members of the Organization of Professional Users of Statistics to try to assess their needs. But there is nothing comparable to the national statistics councils which many countries have on a permanent basis as a forum in which outside users can play a very big part in determining the statistical programme of the government, nor is there a very strong statistics users' lobby to press the case for better figures of this or that.

There has been a phenomenal expansion in the amount of published statistical material going out of government over the last ten years. Quite apart from the huge expansion of Business Monitors already referred to nearly every department has developed its own statistical publications during this time out of what were in many cases just small statistical annexes to annual departmental reports.

The way forward lies, I suggest, if anything, in publication of less detail accompanied by a very flexible and quick service of making the tabulations available on demand.

Publicity for the service

Next, how well is the service publicized? About £50,000 a year is spent in display advertising, mobile displays, leaflets etc. as well as stimulating free publicity in the communications media. It is clearly not enough to change people's attitudes if for whatever reason they are firmly prejudiced against using what is readily available, but it does help to tell them about it.

Quite a lot has been done to guide people to the correct sources. *The Government Statistics leaflet* is produced each year listing well over a hundred contact points in government—there are not many public organizations which go that far—there is a clearing house service at the CSO and the Statistics and Market Intelligence Library for people who can not find the right source immediately. And, of course, a year ago the first edition of the *Guide to Official Statistics* was published which won the Besterman Award and which represented many man-years of work by a lot of people in the Government Statistical Service. Despite all this I have to say that I still hear complaints that people cannot find their way around. There are the usual horror stories of telephone inquirers being pushed from departmental pillar to departmental post until they give up in frustration. Unfortunately one seldom hears the full details of these events; if one did there might be ways of preventing them happening in future. Against this there are obviously very many satisfied customers.

Help to users

Finally, how far does the GSS go in helping people to use the figures? There are two aspects to this. First there is the question of guidance and help included with the published material—were the latest figures affected by strikes, are there any major breaks in the series, how reliable is this particular series, what methods were used? I am not sure whether the GSS does enough of this or not. There is always a reluctance to clutter tables with too many footnotes and the tendency is to keep this to a minimum—leaving the more detailed explanations for annual handbooks, and *e.g.* a new handbook on financial statistics which explains in considerable detail how the various series are collected and how the tables of the monthly publication inter-relate. Virtually every new statistical series that is started warrants a special article in *Economic Trends* or perhaps one of the departmental journals explaining the methodology. And if it is too weighty a special Studies in Official Statistics is published to deal with it. Another facet of the difficulty of getting the balance right is how far statisticians should go in interpreting the meaning of their data. My view is that they should be very bold indeed. But there is an opposing view that if they go too far along this road their reputation for pure objectivity may be put at risk. The second aspect is how far can inquirers be helped to apply statistics to their particular problems: the answer to this, frankly, is very little. It is simply a question of resources. If the CSO had the 600-odd people that the French have, then doubtless much more could be done. But the already overworked inquiry officers can do little beyond either giving people some bare figures, directing them to a published source or perhaps passing them to the appropriate statistician who may or may not have time at that moment to discuss the figures with them. I cannot see this situation changing radically and that brings me back to an earlier comment.

The inability to carry the service right through represents a major constraint on efforts to get our information used as widely as possible. Many potential end users simply could not relate the primary figures to their needs. Unless there are enough intermediary interpreters we shall always have a bottleneck in the flow of information. Specialist librarians have a vital role in this process. The Aslib dipstick survey suggested that 10 per cent of respondents had difficulty in using statistical tables. If that really meant 90 per cent had no difficulty, that could be regarded as a success story.

Concluding remarks

Where can we go from here? I hope I have said enough to convince you that, despite the many constraints on giving the service that we should like, we are in earnest in wanting you to make full use of the information.

The first thing necessary is to establish and maintain adequate links. In some respects there has not been sufficient regular contact between Aslib and the Government Statistical Service in the past. A good formal occasion will present itself next year when the subject of the Statistics Users Conference will be dissemination and it is hoped that Aslib will play a part in its organization.

Secondly, in an environment where particular interest lobbies are becoming more and more important, Aslib might fare better in pressing its requests if it belonged—for this purpose—to a larger group. In the United States in the 'fifties the Census of Production was cancelled because of anti-form-filling pressures on the government. Statistics users only woke up to this two years later but the reaction was swift and very American. They formed a powerful statistics users' conference which now provides a countervailing force to the anti-statistics lobby. Of course comments from Aslib the MRS, IMRA, Business Economists and a dozen other organizations will get a hearing but they would command greater attention if they came from a single body seen to represent a very large section of industry.

Thirdly, whatever their constituency the user has a part to play in ensuring better and more readily available statistics. Seldom does one see letters in the press from outside users championing the need for statistical collection against the very frequently reported opposition. Similarly, to the extent that you have any influence within your own organization or trade association on its attitudes towards statistical form filling it is to be hoped you will exercise them in a positive way.

Some problems in the provision of market research information

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Paper presented at an Aslib conference on Information for business: problems of availability and access, held at the Geological Society of London, 5 December 1977

Introduction

MY INVITATION TO contribute a paper owes something to the fact that I was one of the 'founding fathers' of market research in Great Britain. But things have moved a long way since, in 1947, the score of us who then constituted the whole of the industry got together to form the Market Research Society, and I am not entirely sure that all developments since then have been for the good.

Definition of market research

When the Society was set up it was necessary to define the particular discipline with which the Society should be concerned, and the result was a definition of market research as the collection of information by means of the interrogation or observation of samples of the relevant population, that population comprising either individuals or firms. Particular pains were taken to exclude from our sphere of interest what we then rather disparagingly termed 'desk research', and to make it clear that, while statistics was one of our working tools, our particular proficiency lay in those interrogative skills to which the common or garden statistician could lay no claim.

In those relatively unsophisticated days, of course, information officers were a very rare species, and even librarians were not often found within commercial establishments. But even if they had been around they would then have had little involvement with market research surveys, which were generated because somebody along the line in the management hierarchy felt the need for specific information about a particular market sector, commissioned and received the study, and acted on the results—or sometimes did not. And, *mutatis mutandis*, the same applied with almost equal force to what few continuous market research survey services then existed. Moreover, most people played everything very close to the chest, and the proportion of information which could be regarded as generally available, or which even leaked out, was pretty minimal.

In the thirty years that have elapsed since then, however, there has been something of a change in the situation. The major share of a now enormously greater flow of market research information still follows a channel direct from

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the information supplier to the executive information user, bypassing (and in my view very properly bypassing) the information officer. But the growing need of business management for information peripheral to the day-to-day functioning of its operating staff, combined with the very great mass of external data which can be accessed one way or another, does bring the information officer into the act, while at the same time giving rise to a number of problems.

The findings of a particular market research study, commissioned by a company on an *ad hoc* basis to meet some specific need, are still likely to be treated as highly confidential to that company. But a great deal of the market information which can be derived only from sample surveys is required on a continuous basis, and although in the early days some of the giant marketing companies organized this on their own, the common practice nowadays is to subscribe to one or more of the syndicated services which make it possible for the costs involved, which may in some cases be of an order almost astronomic, to be shared among a number of users.

At the astronomic end of the cost range are such massive operations as AGB's Television Consumer Audit or Home Audit, and the Nielsen Food and Drug Indices, and tailing down from these are a whole raft of syndicated services at various levels of scope, sample size, frequency and sophistication—not to say competence. An important dimension of difference is the extent to which these are client-geared—that is to say, the extent to which the package includes provision for some element of feedback through an interpretative client-service function. At the far end of the spectrum all that really may be offered is the periodic delivery of a standard report, though in most cases there is provision for subsequent special analysis of the data bank.

Confidentiality of information

What has to be recognized here is that there is a fairly strong correlation between on the one hand the size and sophistication—and cost—of the service, and on the other the degree of confidentiality attributed to the findings by their suppliers, and indeed required by these suppliers from their customers. Clearly a research company which charges £30–40,000 a time to fifty or sixty clients would hardly be anxious to have the information available to them in public or university or trade association libraries, even in the unlikely event of such libraries being prepared to pay this sort of money for a single one of the dozens of product-fields covered. Nor would their clients.

The degree of confidentiality required tends to diminish as the costs do, and may become only theoretical when we move away from syndicated services, properly defined, to the sort of information which is disseminated through periodic journals such as those issued by the Economist Intelligence Unit, or Mintel, or a number of other agencies, which can be bought almost across the counter. The EIU reports, of course, do not include much material deriving from market research as earlier defined, whereas many of the Mintel reports do: on the other hand, the EIU reports normally cover the same field period by period, whereas with Mintel you never know what you are going to get from one month to the next. In neither case, however, is there much of a problem either of access or of confidentiality, and the same applies to most of the one-off reports produced from time to time by individual market research agencies, who feel they can squeeze a little extra revenue out of data which they have come by for other purposes, or who believe that a market exists for information which they are peculiarly capable of providing. Nor do problems of confidentiality or access arise with the usually rather generalized market research reports issued by some of the advertising media—newspapers, magazines and even television companies—as part of their advertisement sales promotion activities. The data may be associated with audience data, for obvious reasons, but they can usually be looked at independently of these, as in the case of the IPC marketing manuals. Obtaining reports of this sort is unlikely to bankrupt a unit, even if the price printed on the cover is paid—which many people manage to avoid doing.

Sources of market research information

It is clearly no part of my remit to attempt to list all the various sources of market research information, but I do want to comment on four specific areas.

1. Trade or professional associations

The first of these is concerned with market research studies carried out for trade or professional associations. In theory these should be little different in respect of confidentiality and access from those conducted by individual firms on their own behalf, except that the owner of the information, instead of being one company, is a consortium of companies, and the fact that the cost is shared between them should make it possible to do a much grander job. To discuss why things do not always work out this way would be perhaps too much of a digression, and any observations made about this sort of source would relate primarily to the question of validity and interpretation, which will be referred to later. Note, however, even at this stage the distinction between market-relevant information of an accounting or census type and the findings of market research surveys as defined.

2. Government

The second area is government, which for a great many people is probably the major source of market, as of so much other information. (Refer to the paper by Brian Mower for more information on government statistics.)

The enormous volumes of business-related statistics which government produces are obviously well known, and easily enough identified and accessed. For the most part these are of a census type, based on returns of an essentially accounting nature which more often than not have a statutory legitimacy, but quite a number are the outcome of sample enquiries—the *Family Expenditure Survey* is perhaps the most prominent of these, though there are a good many others, often produced at much greater frequency, particularly in the fields of production, distribution and employment. However, the distinction to be made at this point is not the difference between censuses and sample enquiries—though this has some relevance to the problems of validity and interpretation—but the differences in the essential nature of the information which is available, or in some cases not so easily available as it should be.

The science—or art—of marketing is concerned with the interface between products or services and the people who are the consumers of those products or services, and with the distributive channels through which it is moderated. Of major importance to the marketeer, at the consumption end of the model, is the behaviour and attitudes both of the final consumer and of the distributor, and the differences in these that exist within different segments of the market. But most routine government statistics are concerned with the physical outputs of manufacturing or service industries—cynics might suggest that governments are only really interested in things they can tax—and though there is a not inconsiderable output of population statistics, very little emerges at what I have described as the interface.

The best-known example of interface information produced by government is, of course, the *Family Expenditure Survey* which does analyse expenditure on individual categories of goods and services by certain demographic variables (notably geographic region and family composition) and by the economic variable of total family income. This last is not particularly useful for marketing purposes—socio-economic class is much more relevant—but you cannot have everything, and even this sort of analysis is pretty rare.

On the other hand, government and government agencies also collect, for purposes of their own, a good deal of what might be called social information, which could be of considerable value for market research purposes. Further, much of this is acquired by market research techniques, through the facilities provided not only by the Social Survey division of the Office of Population Censuses and Surveys and such quasi-institutional bodies as Social and Community Planning Research but also by the ordinary market research agencies, for whom government and associated clients provide rich pickings, since they do not seem bothered about how much they spend and are rarely sufficiently sophisticated to insist on things being done in the most cost-effective way, and usually fail to take advice about it.

The customers for this sort of information comprise not only government departments as such but also a whole flock of commissions and committees. In this area it was Robbins on Higher Education who first set the example of going out to collect information on a meaningful basis by means of sample survey, instead of waiting for it to be submitted by interested parties and cranky busybodies, and although Royal Commissions are still somewhat prone to mistake waffle for facts, things are much better than they used to be. The difficulty that arises here from the users' point of view, however, is that much of the informa- is never published: while particular findings may be picked out for the purposes of a report, the detailed tabulations are rarely included. Sometimes they are available separately, but often they are not, and since it is essentially in their detail that they are useful for market research purposes this represents a very considerable loss.

3. Newspapers and periodicals

The third area is the newspaper and periodical press, which for too many information officers is, I suspect, the most significant source of market information. Now the press as an information source has enormous advantages: no problems of access or confidentiality arise, and it is extremely cheap: further, it carries an aura of authority which, though very often unwarranted, permits the information officer in search of an easy life to shuffle off any responsibility except that for handing over the cuttings file. At the same time it has even more enormous disadvantages: insofar as these affect validity and interpretation they are discussed in a later part of the paper; the point to be considered here is the function and motivation of the journalist, since these dominate the nature and form of the information he presents.

The newspaper and periodical press is, for the most part, a branch of the entertainment business. This is not to say that the journalist invents his news—though in many cases, particularly with human-interest stories, it would not in the least matter if he did—but insofar as he is concerned to put before his readers what it will most interest them to read, in a form which will best catch their attention, and for this purpose to select from the massive volume of available material what can conveniently be fitted into a single issue of the publication, he inevitably assumes an interpretative role. This makes for good journalism, but bad communication of objective and comprehensive information, since necessarily he is always in search of sensation—as much in the pages of *The Financial Times* and *The Times* within their context as in the *Daily Mirror* and *The Sun* within theirs, and indeed to a very material extent in the trade, technical and professional press also. Where this is only a matter of a headline it is not particularly important, but because of the selection and compression requirements of journalism the text can be affected as well.

Clearly a sensationally interpretative headline over the latest trade figures does not much matter: if the trade figures are needed users can get them in detail from the primary source. But the report of the market-relevant findings of some piece of research emanating from, say, a remote polytechnic, or incorporated in a stockbroker's report, where the journalist has picked out the most titillating items from a press release which may itself have been written in the interests of publicity rather than scholarship, can be a different matter: admittedly the user might be able to lay hands on the report, but then life is too short—and so may be the library budget, and indeed library shelving—so that the cutting may simply go straight into the file, to be resurrected (and given credence) at some time in the future.

4. Firms

The stockbroker's report and similar source material produced by firms in the financial sector constitutes the last of the four specific areas to be mentioned in the context of access, though here again the real problem is that of validity. Now stockbrokers do not understand what marketing is all about, and neither do bankers: nor, in my experience, do many accountants, though some of them try. In consequence, though the reports they produce often pay some sort of lip-service to the market research approach—it would hardly be respectable these days if they did not—this is rarely handled very professionally.

In the days when I was more concerned than I am now to sell my services as a consultant I wasted a lot of time trying to persuade these financial experts that a marketing and market research capability would improve the quality of their output, but with little success. I am not now certain that they were not right.

The stockbroker, for example, makes his living by processing the buying and selling of shares, and the essential purpose of the reports he produces is to persuade shareholders—more particularly the large institutions—to exchange one perfectly good holding for another, giving him the commission on the deal. He may understand something about the behaviour of share prices, and (insofar as they have any relevance to prices) something about company profits, but if he tries to get involved in market research and its implications for marketing decisions he will probably finish up totally confused. It could be that the cobbler should stick to his last, since few of us can be experts on everything.

The implication of what I have just said is that while stockbrokers' reports and the like would sometimes appear to contain information useful for market research purposes, it is likely to be of a somewhat dubious nature—even if the facts are correct, they may be measuring the wrong things in the wrong way. This brings us back to the question of validity and interpretation, and on to the second half of the paper.

Validity of information

In opening up this question of validity it is necessary to distinguish between two sorts of information: objective and verifiable facts on the one hand, and attitudes and opinions on the other. An objective fact can exist when somebody or something does something, or is something, or has something done to it, at or over a particular period of time. Provided the definitions of the somebodies and somethings are clear enough—and that is mainly a matter of taking sufficient care, though for the information officer venturing into the field of market research it presents a succession of pitfalls—there can be very little argument about what is being measured. Moreover, the data can—in theory at least—be verified in most cases, if sufficient resources are devoted to the exercise, though it may not always be worth while.

(a) Problems of definition

When dealing with the question of opinions and attitudes, however—and these are a very important constituent of market research information—we find ourselves on shifting sand, not only because the definitions are very largely a matter of taste, varying with the purposes for which any particular survey is being done, but also because the findings of the survey are enormously affected by the interrogative technique used: wildly differing answers are obtained by asking questions with slightly different wording, or even by asking the same questions in a different order, all of this being dependent upon the researcher's judgment. Thus, for example, while there might not be a great deal of difficulty in determining how many people in a survey are married, which is a legal definition—though not invariably a clear-cut one in the case of Asian immigrants—there may be some difficulty in determining how many of them are living together, since living together is to some extent a state of mind, and if interest is extended to those people whose union has not been blessed by Church or State there are further problems. Many of these can be overcome by the establishment of certain operating definitions, but if the concern is to determine how many of these couples still love each other, or are happy in their relationship, the fact is that it is difficult to be precise about what is understood by either love or happiness, or about what those words mean to the people whose opinions are being measured.

This is hardly a commercial example, and it is cited simply because it is a colourful illustration of the breadth of the information spectrum. But there are also difficulties in much more mundane fields, as *e.g.* the market for toilet soap. The total market can be measured in three main ways—total value (though it has to be made clear whether discussion is about what the manufacturers receive or what the consumers pay), total tonnage, or total number of pieces. The shares within the market of the different brands can also be measured in the same three ways, and will produce different results in all three. If knowledge about the mechanism of distribution is wanted, one has to note whether the data provided are based on retail research, which will naturally only cover the types of retail outlet included in that research, or consumer research, where errors are encountered due to misreporting and larger sampling errors. It is, however, when trying to learn something about the users of the different brands that one really runs into difficulties, since a user can be defined anywhere between somebody who invariably buys one particular brand and somebody who may buy a cake of that particular brand only once in six months, and if one wants to know something about her attitudes to the different brands one is back with the problem of love and happiness. Any reputable piece of research will normally explain what it has done and what its definitions are, even if only in small print at the back of the report, but in one sense that only aggravates the problem for the information officer.

Nor is this problem of definition in any way confined to commercial market research: it applies very often to government statistics. I recently needed a fifteen-year series for corporate trading profits, and found no less than three different series with ostensibly the same headings and footnotes—two of them in the same publication. There were reasons of course, which were eventually tracked down but that merely underlines the point. And this sort of problem can arise with even the most sacred of figures. For example, in 1952 I was disturbed to discover that an estimate of the number of families in Great Britain in 1951, 15.5 million, which I had arrived at through a sample survey, was almost exactly a million more than the preliminary 1951 Census figure. On investigating why the Registrar General was so obviously wrong I found that he was wrong only in one sense, inasmuch as by his own long-standing definition of a family, relating to where people slept on census night rather than to where they constructively belonged, he was near-enough right. But his measurement not only underestimated the number of families but also produced wrong information about family sizes, so far as any practical use of the figures was concerned.

(*b*) *Professional competence in surveys*

However, the problem of validity goes well beyond the question of definitions. In the field of market research as earlier described there is an even greater problem—professional competence in the design and execution of sample surveys. A not inconsiderable amount of the market research currently being done is rubbish, and the more easily it is available to the user the more likely it is to be rubbish. As *Punch* put it in 1869, 'Nothink for nothink 'ere, and precious little for sixpence', or, if you prefer a more modern locution, 'When you pay peanuts you get monkeys'.

There are a number of ways in which errors can arise in market research surveys. Overshadowing all of them is the question of definition—definition of the problem, of what is to be measured, of what universe is to be covered. Then come the sampling procedures, which can involve imperfect sample design and inadequate sample size, followed by errors in questionnaire design—that is to say, failure to ask the right questions in the right way—and linked to both of these is the possibility that the implementation of the survey has been shoddily done, by interviewers who are inadequately briefed, trained or supervised. Finally, the findings of the survey may be misinterpreted by the research agency itself, or presented in such a way that the user is led to misinterpret them on his own account.

The elimination of many of these errors, or at least their reduction, is often largely a matter of money, which is why there is a fairly marked correlation between the cost of a survey and its validity. On the other hand, a cost-effective approach to business activities necessarily puts a limit on the price which it is rational to pay for a particular piece of information, and something less costly than a Rolls-Royce may still perform the function of transporting you from one place to another. Two major problem areas exist here, however. First, the assessment of the validity and reliability of a particular piece of work, in either statistical or technological terms, may call for skills rather outside the usual repertoire of the information officer, and this opens up the whole question of whether the responsibility for such assessment lies with the information officer or the enquirer. Second, it is really only possible to form a judgment if access is available to the primary material—it cannot be based on a press cutting.

(*c*) *Press cuttings*

This question of validity can be illustrated by consideration of the problem of the press cutting, since to some extent this mirrors the whole picture. Market-related information can appear in the press in a number of forms, of which the most obvious is the reporting of some new piece of information in the public domain, such as the latest price index figure, or retail sales volumes, or whatever. Journalism can be somewhat misleading, but at least there is no problem in getting to the original source material for oneself. The second form, however, is the reporting of some piece of proprietory market research, and here one comes up against the problem referred to earlier, that the more powerful the research the less its proprietors are inclined to give away for free what they are in business to sell: if they issue anything at all they do so for promotion rather than informatory purposes, and are unlikely to include in their press releases any of the warning footnotes or definitions, so that, by the time their enticements have been processed by sensation-hunting journalists, the purity of what is ultimately published may be somewhat sullied. More often than not the journalist has nothing more to go on than a press release, but even if he has been furnished with a press copy of the report he rarely has the skills—or time—to assess its validity, or even to determine for himself what is significant in it, so that he will write his piece around the release rather than the report. This may suit the cowboys of the market research world, but it does not help the user.

Again, it is by no means unusual for publications, particularly in the trade, technical and professional fields, to commission or undertake market research studies, of a sort, as part of what they describe as a service to their readers (these, of course, being quite distinct from the sort of market research carried out as a service to advertisers, as discussed earlier). The drawback of such public-spirited activities also revolves around money: the price which a publisher can afford to pay to fill half-a-dozen pages, as against having them filled by a journalist who is already on the payroll, or even by an expensive freelance, does not usually allow of anything very elaborate in the way of market research, or even of having the simplest research done properly. As Virgil remarked somewhere around 20 B.C., *timeo Danaos et dona ferentis*—'Do not trust the Greeks when they come bearing gifts'.

What has been discussed relates to market research of a fairly formal nature, even if badly done. But of course journalists as part of their everyday work do a good deal of what is in effect market research, by ringing round half-a-dozen important or well-informed people or even by ferreting on their own account among the available primary or secondary source material. In this latter case, by the time what might have originally been a valid piece of information has passed through three or four different hands we are *all* going to a dance, please send three and fourpence.

If I have seemed unduly critical of the art of the journalist, I must make it clear that this is only in the special context with which we are here concerned today, and because many information officers are more dependent on journalists than they care to admit. But insofar as it is the responsibility of the information officer to disseminate information of a validity adequate to the making of business decisions, his objectives are very different from those of the journalist, and so must his standards be. To pass over to the enquirer a file of press cuttings with the observation 'I am sure you will find something useful there' could be regarded as something of an abdication of professional responsibility, but then it may be just as much an abdication to hand over a bad research report. Our culture has for millennia attributed such sanctity to the written word that the phrase 'it must be true—it's in the paper' is rather more than a joke, but I am not sure that it is a legitimate shield behind which the information officer may hide.

Responsibility of the information officer

This leads on to the point of the responsibility of the information officer for the validity of the market research data which he disseminates, or at least for drawing attention to their limitations. To this might be added the question of the relevance of the data, which is simply another facet of the same problem. An enquiry about how many chemist's shops there are in the various countries of Europe can be easily enough answered, once it is made clear what is meant by a chemist's shop, but if the enquiry is part of an examination of the number of outlets available for the distribution of a new product somebody ought to recognize that in many countries chemists, if they are pharmacists, do not sell the cosmetics, or toilet paper, or hairbrushes, which may be the products in question.

But who ought to do the recognizing? Clearly, if the enquirer is fully conversant with the problems of definition, relevance and validity arising in any particular case, he hardly needs the assistance of the information officer at all: at the most he may require a library facility. If he is *not* so conversant, then it might be argued that the responsibility falls squarely on the information officer, but then one has to ask how well equipped information officers are to play the part of polymaths, or how in any realistic way they can be trained to do so?

Conclusion

In the days when it was one of my spare-time activities to promote the acceptance of the marketing concept, I frequently found myself arguing so convincingly for the dominant role of marketing in company operations that the logical consequence of what I was saying was that the managing director should report to the marketing director, instead of the relationship being, more conventionally, the other way about. The dilemma is still there. In the dipstick survey which Judith Collins has described, difficulty was reported by over a quarter of respondents in identifying market research reports, and by almost a half in getting access to them: these figures I do not find surprising. But of the 97 per cent who failed to report that they found any difficulty in using them I would only ask 'Are you sure you understand the problem?'

Is there, finally, a difference in all this between market research information and technical information? My own impression is that the gulf between them is as deep as a Mendip mine. In the natural sciences and technologies there exist long-accepted rules and procedures of research and reporting which give both shape and discipline: that few such exist in any effective sense in the field of market research creates for the information officer a problem of massive dimensions.

I approached this paper with a sense of trepidation: I end it with a feeling of inadequacy, since I have only scratched the surface of a very complex matter, and since it would be unforgivable presumption on my part to harangue you on a subject which you understand much better than I. In hoping that one or two of the points to which I have tried to draw attention will provide some sort of basis for further consideration, let me conclude by quoting the words with which I closed the 'Management Decision Through Information' Conference at Imperial College in 1969: 'The information function is currently held in far too low esteem, largely because traditional procedures for the transmission of information to the top are so imperfect and the information transmitted so indigestible. It is in the correction of these two faults that the future of information technology lies, and in the elevation of information into the decision process.'

Public libraries

Malcolm J. Campbell

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Paper presented at an Aslib conference on Information for business: problems of availability and access, held at the Geological Society of London, 5 December 1977

Introduction

IN ASSESSING THE results of Judith Collins's questionnaire it should perhaps be noted that less than 50 per cent of respondents claimed to spend all or most of their time 'dealing with economic or business or commercial information'. One can only speculate whether a higher proportion of full-time business librarians would have revealed a greater degree of satisfaction due to a deeper knowledge of sources, or of dissatisfaction through a higher level of expectation.

Areas of difficulty

What the survey does reveal, or rather confirm, is the fact that overseas company financial and other information, and market research reports generally, are the areas of greatest difficulty of access. Other gaps in availability might have come to light through extension of the list of areas of information. The questionnaire did not ask how satisfied users were with the provision of information for business in the public, non-fee-charging sector. However, when Aslib surveyed usership of business libraries in Central London over three days in 1974[1] it was found that 27 per cent of users of the four public libraries expressed only partial satisfaction or 'nothing useful found'. Though this is 3 per cent better than for academic libraries and only 1 per cent less than for the private sector, I would still not regard 73 per cent wholehearted satisfaction as cause for complacency.

Complaints about the general level of standards are few though, and as I have suggested,[2] it really is up to the users to make their feelings known in influential quarters; those of us who are providers (or intermediaries) are in a poor position to improve matters without such support. Perhaps the opportunity presented by this conference will be taken to give expression to consumer reaction.

Users' views

As users, are *you* satisfied with the situation where there is, as far as I know, no public place in this country where a complete set of Business International's *Worldwide survey of executive living costs* may be seen, or Management Centre Europe's *Executive remuneration costs*? (Many more salary surveys, even of domestic coverage, are published than are readily to be found in the public sector, and there is a considerable demand for these.) Who is buying *World*

Aslib Proceedings, 30 (9), September 1978, p. 337–341. Printed in Great Britain

copper statistics since 1950—a single volume—at £400? The City Business Library took a deep breath before renewing a long-standing order for the monthly *World metal statistics*, which has increased its price from £40 in 1975 to £250 in the coming year. How many public libraries buy Metra's studies of market conditions in various overseas countries? Or monographs published by the *Financial times* at £50 upwards? How many subscribe to the full invaluable range of McCarthy's press monitoring services?

Even disregarding the area of expensive market research reports, the public provision of which may be open to debate, I could catalogue many more instances of series and individual items which should be more readily accessible. Some trade associations, for example, put a high price on statistics they publish which are basic to any study of the activities concerned and which should certainly be more fully accessible in the public domain. There is a demand for a larger collection of up-to-date overseas newspapers than may commonly be seen at present. (Colindale is neither central enough, nor sufficiently orientated to the need for immediacy in this respect, to satisfy the requirement.

The information gap does not relate only to the highly esoteric or out of the way. The City Business Library dealt with a written enquiry from the librarian of a large company in the north, seeking at least confirmation of the existence of a firm in Delft, Holland. The public library of the industrial conurbation in which he was situated could not help, neither could a library (unspecified) of the most appropriate government department. The Dutch Embassy advised him to write to the Chamber of Trade in Holland. I found the address and telephone number in the Delft telephone directory and make no claim to omniscience for so doing. Neither do I intend criticism of the other libraries concerned. But I submit that there *must* be something lacking in a system whereby a firm has to approach a local authority library two hundred miles away for such basic and readily obtainable data. And there is no public collection in this country of all available overseas telephone directories.

Role of the public library

The role of the public library is overall to provide a large part of the information sought by individuals, organizations and companies whose resources are inadequate to support libraries of their own. Additionally even the largest corporations, with well-developed information facilities, from time to time need help, both in fields outside their own specialities and where cost/benefit considerations dictate recourse to a common pool of data. At present the public library service is failing on two levels. The average standard of provision in the country as a whole is quite inadequate for even the basic needs of business and, furthermore, even the very best funded of local authority services are not in a position to make available the full extent of published information sources, as indicated.

Improvement of services

Supply of any commodity is likely to be increased only in response to demand and in this context there are three major stumbling-blocks in the way of improvement. One is the low level of expectation most business users (or potential users) have of their local public library service. The next is recourse without complaint by those more knowledgeable to better facilities far distant but freely available. Lack of finance is placed last, since this might be less apparent were business houses to show themselves more determined to secure for themselves a better return, in the form of information, for their high contribution to local authorities' rates income.

None the less, there is a situation where information sources are growing more abundant (compare with ten years ago), more sophisticated (we *must* soon come to terms with new technological developments) and more expensive. With the best will in the world finance from rates will never increase proportionately to meet these changed circumstances and consequently, if alternative funding methods are not considered, standards can only fall further and further below requirements.

There are a number of options open, of which the following are some:

(i) to accept the concept of the public library as a low-level provider of business information,
(ii) to seek additional sources of finance,
(iii) the creation of a national library authority with powers to enforce rationalization and co-operation throughout the entire public sector, including academic libraries,
(iv) the establishment of an upper level of support in the form of a National Business Library.

As to the first option, there are some who would be happy on idealistic or other grounds to see the public libraries' role reduced to a minimum on the proposition that business can and should pay for its information (and private enterprise has already begun to see its opportunities in this field). This seems to lose sight of the contribution by business to local authority finance and of the considerable use of business libraries by the non-profit-making and consumer sectors.[3]

One additional method of funding is of course the charging of fees to users, perhaps on the basis of a charge to enquirers from beyond the local authority's own boundaries, for certain types of information, or for a greater depth of service. Most public librarians would regret and resist the introduction of any such element of pay-as-you-use into a service which has always prided itself on being free to all comers. But it is hard to see how, in addition to the general raising of standards, advantage can be taken of the technology which is available to us now, without passing on at least some of the cost to the user (Aslib charges a minimum of £25 for data retrieval from the computer terminal in its own Information Department and the Science Reference Library has its scale of fees according to the data base employed).

Alternatively, national money could be pumped into selected major libraries serving a regional catchment area. The British Library might seem to be the natural agency for this, but in the context of business information, and bearing in mind especially the needs of exporters, it could be that the Department of Trade is the most appropriate government channel for funds designed to promote interests for which it has a responsibility. Such money should be applied to additional staffing, the establishment of a facsimile transmission network and the strengthening of stock.

A further source of support might be direct voluntary aid from large corporations, such as happens in the United States. Again there is likely to be a reaction of repugnance on the part of librarians against the idea of soliciting donations in cash or in kind, but there may be a significant pool of goodwill waiting to be tapped in this way.

Dr Urquhart flew the kite of a 'national library authority' at the Aslib Annual Conference this year.[4] Such a body might well impose a more logical framework, a more economical use of available resources, on the whole spectrum of libraries falling within the public sector. Those of us concerned with operating the component parts of the existing structure would doubtless defend to the death our present independence. However, the replacement of the rating system by new taxes administered by central government is an issue now being debated in this country—it has already come about in Eire. This could prove to be the means by which local autonomy is eroded and a national library authority forced upon us.

A National Business Library?

Against the proposed strengthening of the existing library network has to be set the alternative, or additional, concept of establishing a National Business Library. Angela Allott, of Sheffield Public Library, in her excellent 'overview' of business information at the Reference, Special and Information Section session of this year's Library Association Conference, strongly urged the necessity for this.[5] There is not time here to examine all the possibilities as to the form such an ultimate 'fall-back' institution might take. However, there is no doubt that the British Library would be regarded as the obvious framework within which it should be placed, and thought needs to be given to the appropriateness of that organization for the job of running what would to a considerable extent be a service for the speedy answering of questions by telephone and telex, rather than a conserving research facility. In practical terms too, there may be a higher likelihood of a favourable government response on the basis of providing one of the means for improved industrial and commercial performance, particularly in the export field. The Department of Trade, rather than the Department of Education and Science, would therefore seem to be the more relevant ultimate authority for this purpose.

Conclusions

I hope I have not exposed too much my own preferences and prejudices in this paper, especially as I am myself unclear as to the best means of solving the problem under discussion. Rather I have tried to indicate that there are many possible approaches to improvement of the situation and that to light upon any one of them without very thorough examination could have disastrous consequences. Nothing less than a government-level inquiry could do this, and I therefore propose the following for consideration:

That the Department of Trade, through the British Overseas Trade Board, be pressed to initiate an investigation by experts into the information needs of British exporters and how the public library network may best be assisted to meet them. Interested parties should be invited to give evidence prior to any recommendations for future action.

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BRIEF REVIEW

European directory of business information sources and services. 1978. Center for Business Information, 7 rue Buffon, 75005 PARIS, France.

This excellent publication (EDBISS) has undergone many changes and revisions since its first appearance; there has been a great increase in services covered, and a consequent reappraisal of how the information can best be presented.

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Each ASG has a country breakdown; the annotated descriptions are compiled by correspondents and contributing editors from each European country and, where possible, include both a description and an evaluation of the source or service under review. The point is made, however, that critical evaluation is not always easy, as sources must first be used. Nevertheless, most of us will be grateful for such basic information as a statement of extant titles, contents and prices.

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G. Humphries.

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Career patterns and mobility in the library/information field

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Paper presented at the Joint Annual Conference of the Aslib Midlands Branch and Northern Branch, Llandudno, 4–6th May 1978

Mobility

WHY INVESTIGATE MOBILITY? Particularly, why investigate it *now*? Results from my study on mobility, career patterns, and factors affecting, suggest that what the profession seems to be suffering from at the moment is immobility. Graphic descriptions were given of closures, cut-backs and frozen posts, and of an undesirably low level of staff movement to other services and organizations because of the current economic and employment situation. Over-production of library/information graduates and diploma holders in terms of jobs available, and the frustrated immobility of those unable to find any work in their chosen profession, were also mentioned by our respondents.

These comments are not only valid in themselves. They are also interesting fuel or data in another sense. One of the basic things about employer attitudes to job mobility is emerging here. Mobility is viewed as neither good nor bad. It is very much a matter of degree. A certain variable but low-level incidence of mobility is considered desirable—to dig square pegs out of round holes, and to bring fresh ideas and enthusiasms into a unit. A level slightly above this may be accepted philosophically as a fact of working life. But in any unit there is a critical staff turnover level. When it is reached you get into the vicious circle or negative feed-back loop. If too few experienced people remain to provide basic continuity or credibility, disaster sets in and accelerates or accumulates. There is no time to train the above-average intake of new people properly and at the same time provide some kind of ongoing service.

New recruits are rapidly demotivated and confused. They read the danger signals strong and clear and get out fast. The hard core are increasingly overworked and also demoralized. I have heard a unit secretary say, in a service of this type: 'The next new intake, I shall not even bother to learn their names, let alone get to know them as people. Why bother? They will be gone next month!' One also hears the hard-core professionals stating that they do not intend to put much time and effort into training or indocrinating new recruits, for similar reasons. So eventually even the dedicated hard core may also seek escape routes from an increasingly impossible and totally unrewarding situation.

At the moment, the profession seems to be suffering from both the undesirable

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extremes of mobility. If a unit is a 'nice place to work' it may become a frozen refuge. If it is not, turnover may be undesirably high. There may even be consequent loss to the profession as a whole, as the bolting staff turn to literally any job they can land.

For reasons implied in all this, I feel that *now* is quite a suitable time to study mobility and particularly to study factors affecting mobility. Movement rates and patterns may be slightly atypical. But what, after all, is a 'typical' time or year? One can qualify almost any study with riders stating that '1970 whatever was hardly a typical year because . . .'. On the other hand, extreme situations may flush out into the open for study, underlying reasons for joining or leaving a profession.

What use is it to collect mobility data anyway? Well, on the national level the Department of Education and Science and the British Library, for example, feel that this kind of material is useful for manpower statistics and manpower planning. On a more individualistic level, library schools and employers could find it useful. It might be helpful to know why people want to be librarians or information officers in the first place, what their expectations and motives are on entry to the profession, and how long they are likely to stay—in any one job or in the profession as a whole. Also of potential interest are factors causing movement to other sectors of the field, to different types of employing organization, and sometimes right out of the profession altogether. If we identify these factors, we may be able to do something about them—*i.e.* to control and direct mobility.

Patterns of mobility

One of the first questions was: How long had the current crop of library/information workers been occupying their present job? (*i.e.* working for the same employer and ignoring internal promotion and rises in grading). The average time was 5½ years. On that evidence ours does not sound like a highly mobile field. In fact a colleague commented that my project ought to be called, not 'Job mobility and the occupational image', but 'Job immobility and the occupational stereotype'.

Impressionistic feelings that 5½ years is a fairly long time in a current job could, however, be wrong. Before writing a final report I hope to have located comparative figures for some other professions. But unfortunately I have not yet been able to do so.

This length of current tenure would seem, however, to be a long-term trend in the profession, not merely a reflector of the events of recent years. Analysis of samples of entrants in *Who's Who in Librarianship* 1972 confirm this—indicating relative immobility or sluggish circulation within the profession in the decade prior to 1972. The mean average length of tenure in current job for *Who's Who* entrants was 6.56 years. Remember too, that this was during the more prosperous years of the sixties and early seventies, when workers could pick and choose their jobs more readily than they can today.

Are any particular sectors of the field, or any particular kinds of worker, relatively more mobile than others? On our evidence, it would seem that in recent years librarians, women, and people working in educational services,

	MEAN AVERAGE
Profession as a whole	5.57
Librarians	4.97
Information workers	7.95
Men	8.44
Women	3.91
Public	5.03
Educational	4.19
Special	6.96

(All figures represent years)

TABLE 1: *Length of time in present or last job* (1977)

have been moving from job to job faster than information workers, men, and people working in public libraries or special services.

This mobility trend stretches back in time over the past track record of our sample. If one considers total numbers of jobs held to date, women and librarians again emerge as more likely to shift more often than men and information workers. The picture for the occupational sectors becomes confused because one is considering here people who are *currently* employed in these sectors. In the past, however, they may have also worked in either or both of the other two main occupational sectors. Average age and average length of working life to date—excluding continuity breaks and gaps—are also provided in the next table. Boiled down, the data we have gives some idea of the average length of time people stay in a job in our field. It is based on the whole recorded career of current members of the profession taking part in our study. Now one can project these findings and make guesses about the future. Doing so means making some big assumptions. But then this usually is the case in extrapolation.

One assumes a hypothetical work commencement age of 18 for all. This

	AVERAGE NO. JOBS (MEAN)	AVERAGE AGE (MEAN)	AVERAGE LENGTH OF WORKING LIFE TO DATE (MEAN)
Profession as a whole	4.15	37.62	15.28
Librarians	4.26	36.74	14.37
Information workers	3.62	41.05	19.07
Men	3.98	42.16	20.12
Women	4.22	35.00	12.49
Public	3.15	32.75	10.99
Educational	4.57	37.57	15.15
Special	4.31	40.19	17.97

TABLE 2: *Average number of jobs held to date*

Profession as a whole	3.70
Librarians	3.37
Information workers	5.27
Men	5.05
Women	2.96
Public	3.49
Educational	3.32
Special	4.17

TABLE 3: *Average time-stay per job (in years)*

assumption ignores the fact that in reality some people start work later than this and some earlier. But it does build in higher education as an initial cause of time loss in total career. It also puts the people who educate themselves before starting work on a par with those who do it later by taking time off work. There are, of course, many other causes of career disruption such as war service, taking time off to raise a family, and what the Victorians used to call the Grand Tour, but librarians now seem to call—if our sample is typical—'just bumming around Europe for a year'. Extrapolatory calculations include (but ignore the details of) time loss from such interruptions. Assumptions also include: (a) that people will not change much—this seems not so unreasonable; (b) that external circumstances will not change much. This is a much rasher presumption. But for practical purposes it has to be made. Otherwise the whole thing becomes a highly complex science-fiction exercise of designing multiple alternative futures.

Calculations do, however, posit one probable external change—a hypothetical future retirement age of 60 for everybody. In deference to the status quo, however, a figure is also given for men based on current retiring age of 65. Theoretically this gives men a chance to fit in one more last job. Whether it does so in reality is debatable. The tail-end of a career is not a period of exceptional job mobility for most people.

The projection, as you can now see, echoes the general trend—already demonstrated by other tables—for librarians and women to be more mobile than information workers and men.

	NUMBER OF JOBS
Profession as a whole	8.84
Librarians	9.95
Information workers	6.59
Men	
retire at 60	6.92
retire at 65	7.74
Women	10.42

TABLE 4: *Probable average number of jobs in working lifetime of current library/information population*

Mobility, however, is not just a matter of how many jobs you have had and how long, on average, you stay in them. It is also, and much more fundamentally, concerned with the kind of jobs you have had and how and where you have moved about.

Analysis of work experience

So, I did some career tracking, and analysed combinations and permutations of work experience. The details of this analysis are a bit complicated to present here and now. So I shall just try to select some of the broader findings and implications and present a few simple summary tables.

Are there differences, *e.g.* in the career patterns and mobility of librarians and information workers? The answer is yes. The first finding was that the two fields seem to be discrete and fairly self-contained. There was not much osmosis between librarianship and information work in our sample. *But*, people currently working in information were more likely to have some past experience of library work than those now employed in libraries were to have prior experience of the information scene.

As far as mobility is concerned, this seems to imply that what internal movement there is flows towards the information sector. The implications are that this is perceived as the 'better job'—the more attractive, prestigious, interesting, satisfying or better-paid occupation. Once in it, people did not seem inclined to move back into the library field.

Fluidity between the two sectors of the profession was not, in fact, as great as the exchange rate between the combined library/information profession and completely different occupations. In the light of this finding alone one might

	PROFESSION AS WHOLE (%)	LIBRARIANS (%)	INFORMATION WORKERS (%)
Both kinds of work	16	13	27
Either/or experience only	84	87	73

TABLE 5: *Experience of working in both libraries and information services*

	PROFESSION AS WHOLE (%)	LIBRARIANS (%)	INFORMATION WORKERS (%)
Experience confined to library information field	53	57	34
Outside experience of quite different occupations*	47	43	66

* Excludes student and vacation jobs

TABLE 6: *Extent of outside experience (other jobs)*

be tempted to give some credence to the point of view expressed by some information workers, *i.e.* that there is no such thing as a combined library/information profession. These are two distinct and separate professions. Tables back up the trends just described. Differences in basic career patterns of men and women are equally interesting. In spite of the fact that currently information work tends to be a male profession and librarianship a female one, there seems to be no difference at all between men and women in extent of *some* prior experience of either occupation.

Extent of experience of outside occupations did reveal a considerable difference. Women were much less mobile than men as far as the interface between our field and other professions was concerned.

This trend would appear to be an important one for employers and planners to note. Women may have shorter and more mobile professional lives than men (mainly for domestic reasons, and perhaps better creche and nursery provision could help change that—if it were desirable to women and to the establishment). But women seem more likely than men to stick with the library/information profession and not venture outside it.

Whether this reflects greater professional committment, or the alleged personality differences between men and women, or simply female recognition of more limited career potential outside, *i.e.* the operation of external factors is, however, debatable.

But what about movement within the field—to different kinds of employer and organization? If our sample is in any way typical of the profession as a whole, the librarian's experience would seem to be wider *within* the field, and different from that of the information worker. The librarian was more likely to have worked for a greater variety of different kinds of organization—as a librarian, however.

The librarians' experience was also loaded towards the public and educational

	PROFESSION AS WHOLE (%)	MEN (%)	WOMEN (%)
Both kinds of work	16	16	16
Either/or experience only	84	84	84

TABLE 7: *Experience of working in both libraries and information services*

	PROFESSION AS WHOLE (%)	MEN (%)	WOMEN (%)
Experience confined to field	53	38	61
Outside experience	47	62	39

TABLE 8: *Extent of outside experience (other jobs)*

employment sectors. The information worker's experience was—as we have already seen—wider outside the field, but narrower within it, where it was heavily loaded towards industrial or commercial experience.

Outside the field, the nature, as well as the extent of work experience, differed in some respects between librarians and information workers. Both were quite likely to have been teachers at some stage. But here parallels seem to end and differences set in. Jobs in the communications field or as a scientific or technical practitioner were a likely background for an information worker, but not for a librarian. Past experience of librarians was more biased to socially useful or 'do-gooding' jobs and more likely to include secretarial or clerical and semi-skilled or unskilled work.

People now in the information business tended to have entered this profession later, after training for and working in some other occupation. But information work *is* a younger profession than librarianship. It is very probable that suitable jobs in this field were not around in abundance when many of our respondents started work, or that the occupation was not widely known or publicized, and so did not come to their attention as a potential career on graduation.

Analysis of differences in the occupational sectors tends to spotlight the public librarian: least likely to have experience of outside work, information work, or fringe work on the borders of the profession. Possibly this was a predictable finding. Certainly it is an understandable and believable one. The public library is frequently thought of as the 'hard core' of the profession, or as the archetypal library. So the public librarian could be viewed as most experienced or least experienced. It depends how you define and evaluate experience, and what you think the profession is all about or trying to do. If librarianship is defined in terms of possession of certain professional techniques, skills, expertise and as continuous experience in their application then, by the evidence of our study, the repository of professionalism and the most experienced people will be found in the public library.

If you believe, however—as a substantial proportion of the profession apparently do—that library/information work is fundamentally concerned with helping other people (a service profession), then different value judgments are made about relevant experience.

In this conceptual framework of bibliotherapy the profession is seen as having much in common with the other 'caring, helping' professions—like nurse, doctor, social worker, teacher. If this is thought to be the case, then the more experience of working in other occupational contexts you have the better. Outside experience and fringe experience on the edges of the profession *is* relevant from this standpoint, because it provides a deeper understanding of other people and their needs, and an objective perspective on library/information work itself. The most experienced workers from this viewpoint are to be found in the special sector.

Wastage

Before concluding I would like to focus—unfortunately briefly—on the important subject of wastage. The most basic form of wastage must surely be unemployment. About 12 per cent of the people of employable age in our sample were unemployed. Reasons for not having a job fell into two distinct categories. Either they could not get a job no matter how hard they tried, or they could not get out to work because they had young children. Women out-numbered men in the unemployed group. About 5 per cent of the men and 17 per cent of the women were temporarily out of service through genuine unemployment or premature domestic retirement.

A further 11 per cent of our sample were working currently in jobs right outside the profession. So in fact our study indicates that about 23 per cent of the people who train for library/information work may end up doing something quite different—which includes doing nothing at all!

It would also seem that 38 per cent come to the profession late, after giving part of their productive working life to some different occupation—such as teaching, communications work for the media or in public relations, scientific or technical work, or secretarial/clerical work.

Incidentally, people appear to *desert* the library/information profession for much the same range of occupations as previously practised by late entrants. This perhaps throws some definitory light on the profession's motivation, identification, and self image. However, to return to late entrants. Not finding, or not finding out about the career that really suits you soon enough, can definitely be classed as a form of wastage. Complaints by respondents about poor careers or vocational guidance at school and university, and about the lack of publicity or accurate information concerning our field, tends to support this view. But whether you really regard this kind of different prior experience as life-wastage, and whether you count subsequent defection as total wastage of professional expertise and training, depends on taking a broad or a narrow view.

Some people within the profession think of this kind of mobility as highly defensible, as a good thing for the individual concerned and for society as a whole. Outward-bound mobility is seen as a missionary extension of professional skills which are useful in contexts other than libraries, and beneficial to the image of the core profession. The way one looks at this depends very much on personal ethos and value system. Persuasive arguments can be constructed to support either point of view.

Getting to know the user better

Andy Exon

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Paper presented at the Joint Annual Conference of the Aslib Midlands Branch and Northern Branch, Llandudno, 4th–6th May 1978

THIS PAPER SEEKS to spotlight some of the theoretical problems in User Studies; to suggest a strategy for selecting a method of user investigation; to illustrate possible methods through the results of recent research and to consider the general question of the applicability of results.

What is User Studies?

A popular view of User Studies is that it is a waste of time. However, we all want to be good managers, and the essence of good management is:

(a) to identify objectives,
(b) to devise effective ways of achieving them,
(c) to monitor the performance of systems.

Since all information systems have as their ultimate objective the transfer of information to users, the study of users has to be a cornerstone of librarianship. In other words, user study, or the analysis of demand, is integral to good management.

So what is User Studies? It is defined at the Centre for Research on User Studies (CRUS) as a multidisciplinary area of knowledge, being the study of the behaviour of users (and non-users) of information, and of information and information systems and services. Individual studies of users may be of different kinds, reflecting their different purposes, but all have as their ultimate objective the precise matching of information with user.

There are numerous and debatable definitions of User Studies. For example, the terms 'use' and 'usage' are often used interchangeably, while 'user' is frequently taken to include both a potential user, and a non-user. 'Use' itself is an open-ended field of research. On the other hand, there is a semantic entanglement among the terms 'need', 'want 'and 'demand', thrust into an entirely new dimension by converting them into plurals. Again, while 'cost', 'benefit' and 'value' occur regularly in the literature, the informed layman has little guide as to whether these terms are being defined (by their users) according to the rules of economics, sociology, or ethics. Meanwhile 'data' and 'information' remain ever-elusive.

Recently attempts have been made to tidy things up. The dialogue maintained

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by Line[1] and Roberts[2] has helpfully drawn the battle lines for the debate over use/need/want/demand. Newman[3] draws helpful distinctions between 'cost', 'benefit' and 'value'. Belkin and Robertson[4] and Pratt[5] have modernized the debate over the definition of 'information'; Belkin[6] has recently reviewed progress in this debate. Yet we still have (excitingly) no philosophical consensus and my contention is that the debate is strictly epistemological.

Special libraries and User Studies

The study of the users of special libraries is particularly informative for a number of reasons:

1. The nature of their position within their parent organization means that demand is more volatile than that for public libraries (for example); special libraries are thus more sensitive to the needs of their users.
2. The flexibility of their internal structure enables them to respond more quickly to changes in user need.
3. Paradoxically, a wider variety of data types and information packages is used than in more general services.
4. The specificity of their subject interests gives more detailed insight into the behaviour of users in different subjects.
5. Because the special library is more closely linked to the research process which generates demand, it is better placed to observe it.

Special libraries also pose special research problems:

(a) They have a shortage of resources for research.
(b) The general shortage of funds prevents their setting up the 'ideal' service.
(c) They are often politically weak: it is usually better to be seen to be doing a good job.
(d) The number of users is often too small to produce statistically significant results.

A user study

How does one set about doing a user study? The complexity of the research process has been referred to elsewhere;[7] here I propose to consider a much simplified structure:

- Hypothesis formation
- Selection of observation method
- Analysis of observation
- Interpretation of results.

Hypothesis formation

There must be some questions which the proposed research is supposed to be able to answer. Three areas of speculation have recently proved particularly interesting.

(i) The first of these is elasticity of demand. Elasticity is a metaphor for the potential expansion and contraction of usage of a system. The elasticity of demand for an information service is the difference between the minimum and maximum use of it over a given period. Information officers classically wish to expand the usage of their services. Leaving aside the growth of use simply through the accretions of time, we are lead, when considering how to increase usage, to wonder if an alteration in the type of service will alter the level of usage. Interestingly enough, demand can be very inelastic, or static. For example public libraries are provided for use by the whole population of the UK but it is often assumed that in practice they are used by about one-third of the general public and, socio-economically speaking, the top third, whose interests they now principally reflect. Mann[8] has contributed widely to this field of research. Although many public librarians have recently argued for the addition of new services for the remaining two-thirds, it has been held by others that, amongst other things, the demand for public library services is inelastic—that, whatever alterations are made, there will be no change in the level of usage—up or down. For example, in the study of Upton Public Library in Chester[9] the rearrangement of books in the lending library, according to previously ascertained reader preferences, led to a small change only in readers' acceptance of the service, although the number of loans increased by over 20 per cent. Specialized information services, on the other hand, have a notoriously elastic, or volatile, demand. An example of the study of the needs for, and effects of, innovations in service is the work of Slater and Keenan[10] on the current awareness methods used by physicists before and after the introduction of *Current Papers in Physics.*

On the question of elasticity, in general I suspect that if plotted graphically it would not be represented by a continuous line. There is a relatively high level, below which the level of usage does not simply fall but disappears completely. In other words, there is a fairly high minimum level of information activity, which is maintained independently of the information officer's control. A fall below this, the complete disappearance of the service, is the result of completely external forces.

(ii) The second problem area is the urgency of demand. The stock figure in the mythology of the special librarian is the user who wants something 'the day before yesterday'. But, in reality, how long can a user wait before getting his information? This question is obviously fundamental to the design of cooperative lending schemes, for example. In 1974, Houghton and Prosser[11] collected some data on this question. Their results might be represented pictorially as a symmetrical curve. Comparison of this curve with the assymetric curve identified by Duncan[12] suggests a lot of important questions which information service managers might consider when allocating resources to enquiry points.

(iii) Lastly, I should like to touch upon the question of system failure. It is contended by some that use is most effectively studied, from the point of view of system improvement, by studying cases when people use libraries unsuccessfully. It is an interesting, down-to-earth idea, and was recently used by Urquhart.[13] The report described how people were interviewed outside the library (in this case, the public library) to identify unsuccessful users; the case then being investigated to see what had gone wrong, the user or the system? This research emphasized the frequently ignored distinction between those users who go away dissatisfied (possibly with good reason), and those who

PURPOSE:	WORK	'UTILITARIAN'	'SOCIAL'		'PERSONAL'	LEISURE
		Extrinsic	Books reviewed and recommended by opinion readers Self improvement		Intrinsic	
	Work books	Home manuals and reference	Non-fiction	Fiction	TV	Distraction
	Texts Manuals	Cookery Car manuals	History Biography	'Good' novels	Soap opera	Romances Mystery
	Reference books	Guides Hobbies	Memoirs Travel TV documentaries	TV 'Classic' serials		Detective
For reference only				May be read and re-read		
Buy to have at hand Borrow to extend knowledge Buy good ones previously borrowed Buy as a gift		Buy or borrow for self Perhaps buy after reading borrowed copy Buy as present if recipient's taste is known, but status present anyway	Buy as present only if recipient's tastes very well known		Buy paperbacks Borrow from library or friend 'Throwaway' Doubtful as present	
		Challenge to reader's attitudes and beliefs			Reinforce the reader's attitudes and beliefs	

FIG 1: *A model for the analysis of information seeking*

depart apparently satisfied but who, one may have good reason to believe, had not got what they needed.

A useful by-product of this research will be a teaching package, designed to teach public librarians ways of studying system failure.

It is worth looking at the overall context of information-seeking behaviour patterns within which we are working. The model (Figure 1) CRUS has found most helpful was developed by Ford[14] from one proposed by Mann.[8] As one travels across the table, one sees at the top a work–leisure continuum, beneath each 'point' of which cluster types of material sought for that purpose. Next we note something about the type of use generated by the purposes at each point. Then it is suggested that certain generalized motives can be deduced, and we see that underlying the work–leisure continuum we have a broader continuum. This begins with the simple extension of an individual's knowledge. Then, as the purposes become (on this continuum) more related to social factors a challenge to the reader's attitudes and beliefs is observed, whereas at the other end, where material is sought for private pleasure, it seems that these are reinforced.

Selection of observation

There is a wide range of techniques available to a potential investigator of an information service. Now this paper is not a lesson on how to do a user study, nor a treatise on methods. But it is worth considering for a moment what can be got out of various kinds of research. In Figure 2 we see these methods arranged (all inclusively) according to two common factors. Along the horizontal axis of this 'graph' we see a development from the subjective approach (analysis of the investigator's own perception) to the objective (observation of phenomena independent of the investigator). But on the vertical axis we see at the same time that investigations tend towards being qualitative (intuitive analysis) or quantitative (analysis dependent upon the rules of statistical inference). One can also see further subdivisions. Thus, research may be

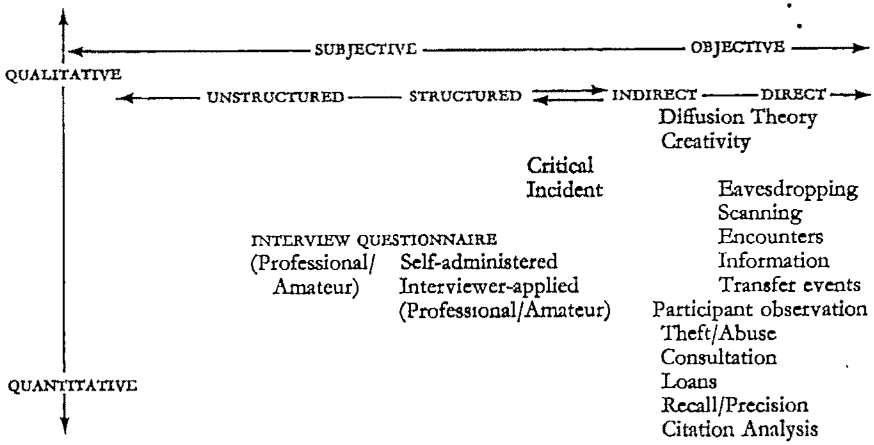

FIG 2: *A classification of investigative techniques*

either unstructured or structured; in this model it is suggested that the amount of structure is related to the degree of objectivity. Overlaying this one can see also that the method of observation (which it is assumed here tends to occur anyway towards the objective end of the spectrum) subdivides further into direct (observation of use) and indirect (observation of evidence of use).

The purpose of looking at methods in this kind of overall way is twofold:

1. It helps the researcher select a method best suited to the needs imposed by this original question. For example, in order to investigate the needs of a large number of people dispersed over a wide geographical area, it would probably be necessary to select a method which was QUANTITATIVE (because of the large population size) and OBJECTIVE (because of the difficulties for the investigator in seeing them all).

   In another case, perhaps that of the information officer in a small unit, it might be better to choose a method which was QUALITATIVE (because the numbers of people would be too small for valid statistical influence) and SUBJECTIVE (because most of the observable phenomena would involve the information officer himself).
2. The other value of this kind of grid is that it suggests how reliable the results are going to be. For example, in choosing self-administered questionnaires as a survey tool, one has to bear in mind, while designing the survey, a number of technical matters, such as the sampling method, the design of questions, and the conversion of the responses into analysable form. But one has also to consider, where do the questions come from? Are they pre-judging the issue of the surveys, is management going to be convinced by statistical arguments?

In another situation one might select some method of observation, such as encounters, but one would have to ask if the people the service was trying to help ever came into the library at all. Is one investigating the wrong group?

The choice of a method depends critically upon the special nature of the individual situation requiring investigation.

In making this choice in its own research, and advising other investigators, CRUS has often found it useful to stop thinking of the user simply as working in a particular discipline (*e.g.* microbiologist, art historian, social worker), but to consider what approach the user is adopting to solving the problem which is generating information-use.

By looking at the different types of demand occasioned by different stages in his work, the information may perhaps be injected in a more timely or convenient way. In other words, if we look at the information-gathering roles forced on a research worker by the stages of his work, the information officer's work can then be to package information in ways suitable to those roles if and when they come to be assumed. In practical terms this means that instead of thinking in terms of systems into which the user has to be fitted (*e.g.* 'let's circulate a bulletin'; 'let's buy in Lockheed'), one can think critically about which systems would be of most help at the time, and in the way, most suited to the user.

As a last point on the methods of study, one would recommend any investigator most strongly to ask himself: What am I observing? Do I have to? Am I intruding? Does it matter? What shall I do with my observations?

Designing the investigation

So far we have considered the questions one must ask before setting about doing research; now we come to consider certain aspects of the process of investigation.

The ultimate aim of user studies is to match precisely information with the user. One assumption frequently made until fairly recently was that the information in different disciplines was inherently different in its behaviour. Thus, the accumulation of results from previous surveys has tended to follow the traditional classification of knowledge into disciplines (Physics, Chemistry, Biochemistry) or groups of disciplines (Science, Social Sciences). The concept of cross-disciplinary studies (*e.g.* Environmental Studies) was inherently compatible with this view, since comparisons are frequently made between groups, especially where a group is being newly investigated.

Matching information with the role of the user

A development of this idea is to assume that because the use of a certain type of information implies a particular kind of job (*e.g.* Physics information implies a Physicist as user), then the performance of a certain job implies the need for a certain type of information (*e.g.* Physicists need Physics information). We all know that this works up to a point, but that on the edge of each subject there is an all-important periphery which, when we come to look at less tidy jobs (*e.g.* Social worker, Member of Parliament, Policeman, Housewife) becomes increasingly the concern of the specialized information officer. This situation is mainly the result of the general relationship between disciplines, but evidence is beginning to become available to suggest that there is an alternative way of looking at research workers.

White[15] examined what happened during the research projects undertaken by a group of economists in her university. One of her conclusions was that 'in the process of locating information to serve different functions, researchers develop different patterns of behaviour'. In some ways this is to do no more than to state the obvious, but as indicating a line of research it is very interesting. By suggesting that the information requirements of the user are directly related to the role he is playing, or the function he is performing, the possibility is held out for a way of tackling the problem of the cross-disciplinary user.

This phenomenon was one encountered in a surprising fashion during our research into the information needs of humanities research workers. Although we began by dividing them into the usual groups (Historians, Linguists, etc.), examination of groups such as Archaeologists quickly showed that a single research worker would exhibit a chameleon-like quality, becoming now a palaeographer, now a geographer, now a nuclear scientist, sometimes even an archaeologist, as his work developed. In fact what was happening was White's Phenomenon: the type of information sought was not related to the subject of study, but the role being performed at a particular stage in the research process.

Thus, it now appears that overlaying the classical division of intellectual activity into subjects of study, classically (in library terms) arranged in schemes like the Dewey system, there is quite a different structure based upon processes common to different disciplines. This substantially enriches our understanding of the behaviour of information-seekers, and it increases the range of alternative solutions to problems in the design of information services. It has now become an honourable tradition. In 1975 Robertson wrote of the seminal work by Bitz, [16] '. . . the comparative analysis of organized scientific specialities which initiated this study was transmuted into an analysis of how everyday research tasks were structured and set.'

Research methods

I should now like to refer to our table of methods and give some current examples of research from each type.

The practising information officer faced with a pressing management problem probably never considers '*doing research*' as a solution. He will probably look first at his own management data (day book, circulation figures, turnstile data), which is at the Objective Quantitative corner of our frame. It is hard data, and it is the basis for the classic library survey.

A large information system, say a public library, or perhaps a multinational corporation with its greater resources, and more complex structure and problems, may be able to do work on a larger scale, revealing more of the perceptions of the user: the questionnaire. The Upton Study we have seen is an example of this. Another is the unpublished survey, conducted by the British Computer Society Computer Information Group, of the general information-seeking behaviour within the UK computer world. The purpose of this type of study is to collect data which may be used to *predict* the behaviour of users under various conditions.

But work in this area presupposes that we know what questions to ask. There is a considerable body of results from previous surveys of most disciplines, but it is rarely possible to transplant entire questionnaires from survey to survey. The design of the questionnaire takes us into the Qualitative Subjective corner of the table. Here we are not collecting predictive data, and the analysis is more intuitive and less automatic. A recent example is Blagden's work on the ACCESS source in the GLC.[17] This study showed that the service was demonstrably successful when judged in its own terms, but that when the usefulness of this service was compared with that of other sources of information used by the ACCESS clientele, it was seen to be only one tool, and a relatively unimportant one at that, in the users' problem-solving bit.

This kind of insight is gained by going outside the library, and many would take the more cautious view that the information service as it is ought to be perfected before it is expanded. Investigation of in-library use, necessarily Qualitative, can be of help here.

One can simply observe everything that is happening. For example, Beaty[18] is testing, as part of her Ph.D. research, several observational techniques, ranging from simply eavesdropping on user conversations, to counting the number of seats occupied at certain times.

Another technique is being used by Barnes[19] whose Ph.D. involves studying amongst other things, the non-verbal communication occurring during encounters between users and staff at service points in a public library.

At this point in library research we are using methods from the behavioural sciences rather than from information science, although we are examining library-based phenomena. The development of this importation of techniques from other disciplines may be seen in Wilson's[20] study of the information needs generated by the day-to-day work of local authority social welfare workers. This project consists of a researcher working alongside the social welfare officer throughout an entire working week, noting every single information transfer event (ITE). The analysis of these ITEs is hoped to enable the project team to design and implement a special information service for this type of local government officer.

This kind of research is likely to have far-reaching implications for both library research and practice, but still it inevitably leaves many questions unanswered, and we have to turn to the two most extreme examples we have found of this kind of qualitative research, *e.g.*

(a) Blom[21] is investigating a group of research psychologists, hoping to understand the research process by breaking it down into a chain of actions, or decisions, or problems that have to be overcome. His study is to be intensive and continuous, but it is still external.

(b) Beard[22] bravely undertook a type of research which is best described as participant observation. The assumption is that most investigation suffers from being done from the outside, even in the case of Wilson's intensive study of social workers. In Beard's case the researcher was employed to work within the department, performing ostensibly similar functions, but actually observing how her colleagues worked, generated information problems, and set about solving them.

Of course this kind of research is enormously expensive, especially in terms of the predictive results it produces. Its values include helping other research workers in designing their research. However, it cannot be over-emphasized that once the simple system-performance measurement stage has been passed, what is most important is for the information officer to seek to get to know his users' work-patterns as well as possible. White felt that in order to be intimately aware 'of the state of progress of the projects of the academic researchers with whom he works, a subject specialist must, of necessity, move beyond the oasis of the academic library into the environment of the researcher himself'. The subject specialist should ultimately and ideally be 'accepted as a colleague who is as well acquainted with the literature, theory, methodology, and terminology of the field as another colleague in the field'.[15]

Interpretation and application of results

The last stages of a user investigation are the interpretation and application of results. Clearly the method of analysis will define the kind of interpretation. A quantitative study will require statistical analysis, and the interpretation of the results will have to obey the rules of inferential statistics. The extent of the sophistication and rigour of this will depend upon:

	STUDY							
SOURCE	*Scott*	*ACSP*†	*Herner*	*Fishenden*	*Herner*	*Martyn*	*Glass & Norwood*	INFROSS
DATE	(1959)	(1965)	(1954)	(1959)	(1959)	(1964)	(1959)	(1971)
Citation in current reading matter	5	10	19	—	13	19	7	30
Abstract/index	4	40	15	23	12	13	6	18
Bibliography	—	—	14	3	6	4	2	12
Library catalogue	18	10	8	12	9	4	—	8
Reviews	—	10	8	—	9	—	4	10
Personal	30	30	19	—	11	28	33	14
Chance	41	—	17	—	12	17	33	8
Other	2	—	—	62	28	14	15	—
TOTAL	100	100	100	100	100	100	100	100

* Adapted from Skelton.[23]
† Advisory Council on Scientific Policy.

FIG 3: *Most effective retrieval methods**
(Percentage of respondents)

- The complexity of the problem
- The amount of data which has been collected
- The extent of the resources at the disposal of the investigator.

I want to leave these questions aside, for the moment, and consider the general meaningfulness of results.

At almost every stage of this kind of research one wants to refer to the accumulated results of similar research, and one of the most useful in this field is Skelton's[23] tabulation of the results of some major user studies (Figure 3).

This is a much-quoted table, notably by Brittain.[24] This version is that appearing in Ford.[14] Referring to this table we note that various retrieval methods were considered; in this case respondents were asked to state which they found 'most effective'.

In referring to Figure 3, we note that the ACSP survey of scientists in 1965 reported findings in which we note that a high proportion of respondents rated abstracts as most effective. However, Scott's study, undertaken only six years previously, not only reported only 4 per cent of its respondents feeling this way about abstracts, but found the majority of its respondents rating 'chance' the most effective method, a method not reported in the ASCP study.

When we cumulate more studies of scientists, we find an increasing degree of discrepancy, and when we come to compare results between disciplines (in this case using Social Scientists) we begin to see that cross-survey comparisons are very difficult, to say the least. Brittain comments upon this table:

> 'The Science Studies were chosen on the grounds that they contained data on some of the areas covered by INFROSS, and data collection and presentation were in a form that made comparison possible. It turned out that the comparisons were very difficult to make, and this in spite of the fact that the best possible data for comparison were chosen. It is obvious that comparison of the results of studies selected at random from all user studies would be almost impossible.'

Nevertheless, in doing our own research into the information needs of the general public, we considered the possibility of a similar cumulation of survey results in that area, producing amongst others the following (Figure 4). Here one sees very little agreement between the investigators for each characteristic of the population.

Now, to display tables such as this in a rather critical way is not to argue against either the performance of user studies, or the cumulation of results. It is more in the nature of a warning against over-generalization of results, a little pinch of salt to improve the flavour of the dish. For this kind of table can

	EUROMONITOR	MANN	GROOMBRIDGE
Sex	Women	Men	Equal
Age	50+	16–20	36–55
Class	AB	C1	Equal

FIG 4: *Book borrowing. Categories in which largest proportion of each sample falls*
N.B. The bibliographical details of these surveys may be found in Ford.[14]

teach us useful general lessons. Since the numbers in these tables are percentages, one should not try to produce averages; but one can see a clear trend towards 'chance' as a highly rated retrieval method, and the tantalizingly undefined 'other' as also important. Thus, even if we assume that all abstracts, journals, etc., were obtained from 'the library', over half of the users apparently looked elsewhere than the library for information.

This concept of 'penetration' has been looked at by Blagden[17] in the ACCESS study, where the penetration ratings for four groups of users ranged from as high as 75 per cent to as low as 18.4 per cent. He concluded:

> 'Regarding penetration as being poor can be demoralizing but requires some knowledge of the user and his perception of a library before deciding what action should be taken.'

Conclusions

In talking about User Studies, I have tried to show that this discipline is inherently useful to practising librarians. In many cases, what passes for a user study might well have been part of standard management practice. In other cases, the investigation is one that only a full-time researcher can do over several years, but that even so the results are still of use to the profession as a whole. In these cases, however, I have suggested that the research worker is in a difficult position with regard to the application of his results, particularly when he has been breaking fresh ground, because of the overriding influence on system managers of external forces. On this point, the acceptability of research findings to policy makers, I should like to leave you with a characteristically tendentious quotation from a recent lecture by the economist, Milton Friedman. While observing a turning of the tide in politician's economic strategy he feels that 'turning is not so much because of the influence of thinkers as because of the brute force of events.' (*The Listener*, 27th April 1978, p. 528).

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Educating the special library user

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Introduction

A COMMON DEFINITION of user education (otherwise known as reader instruction or library instruction) is:

> *A process whereby the library user is firstly made aware of the extent and number of the library's resources, of its services and of the information sources available to him or her, and secondly taught how to use these resources, services and sources.*

The first part of this is usually regarded as library orientation and the second often as bibliographic instruction.

Note that this definition implies that we are concerned with the retrieval of information. Many librarians would extend it to include the teaching of the handling and organization of information. This would include discussion of the broad structure of the information system at a national or an international level, as well as instruction in the organization of information systems at an individual level, *e.g.* teaching the compilation of personal indexes. Some librarians would extend the definition even further, to include the teaching of a range of study skills and communication skills, *e.g.* teaching report writing.

My own feeling is that user education should take in all these sorts of skills, because they all involve aspects of information the retrieval of information, the organization of information and the communication of information—and I do not see that it makes sense to consider one in isolation from another. This view of course takes user education beyond the context and environment of the library or information service.

User education in special libraries and user education in higher education libraries

My purpose here is not to advocate user education in special libraries, but if I were to find myself presenting the case for it, I must admit I would find it difficult to do so.

In the higher education library sector user education can be justified in several ways and most of these have something to do with the fact that the library is just one department within an educational institution and so user education is just one part of the educational process. The library user in higher education will use the library frequently on his own and independently of the librarian.

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There is often not a strong relationship between the librarian and the user. The librarian, in fact, in some establishments will mainly provide the facilities of a library service and may do little to assist the user to get the information he or she requires, not because he or she does not want to but because there is not the opportunity.

In the special library the same circumstances do not obtain. The term 'user education' must seem a strange concept. The educational aspect no longer applies in the sense that it does in higher education, and the user I have just described is not I imagine the user that one would find in the special library. The important point in this sector is as I see it the concern to *provide information* to the special library user. User education might be translated as 'do-it-yourself' or 'get-it-yourself', which I think runs counter to the philosophy of the special librarian.

Nevertheless, user education is by no means unknown in and around the special library sector.

Current situation in special libraries

For a picture of the current state of user education in special libraries I am indebted to the draft report of a study by Catherine Sullivan of the Aslib Research Department. This was completed in April 1977. It resulted from her survey of 1,437 UK special libraries to investigate the nature and extent of user instruction given. The survey was conducted by postal questionnaire and then by selective interview.

Six hundred and ninety-eight special libraries replied and I was surprised to find that 78.4 per cent of these gave instruction. Admittedly a substantial minority of this percentage provided it on a selective basis only. Popular factors determining provision in these circumstances were the demand or expressed interest of users, and their status (if that is the right word) within the organization, *e.g.* newcomer.

It must also be admitted that a conducted tour of the library/information unit involving a description of resources and services accounted for a lot of the instruction. However, a tour was often only part of a variety of activities which constituted user instruction and some included series of lectures, guided practical assignments and group discussions. Similarly a variety of techniques were taught apart from just descriptions of resources and services. But generally most of the user education was of the library orientation sort.

Conclusions from the user study report

1. Government departments were more likely to give instruction than private industrial/commercial organizations. Where instruction was given selectively, government departments tended to take into account the general status or work activities of users, in contrast to private industry/commerce where regular, personal usage and time available were more important factors. Learned professional societies, on the whole, only gave instruction at the request of the users. Government departments were also more likely to utilize lectures as a format of instruction than other employer groups.

2. Units with a science as a major discipline were more likely than those with social sciences or humanities as a major discipline to instruct users. The type of instruction in the science units, excluding engineering, tended to be more extensive and covered more in-depth areas of literature use compared with social sciences and humanities units.
3. Although time available to librarians/information officers influenced the amount of instruction given, especially to managerial/administrative users, it was not an overriding inhibitive factor.
4. Instruction was more likely to be given in units where there was also a high level of 'publicity' generating activity. Many interviewees referred to the importance of the promotional value of user instruction for the unit.
5. On the whole, interviewees felt that some user instruction was necessary in special libraries, favouring the continuance of some impromptu instruction alongside the more organized instructional activities.
6. Finally, the general nature of relations and activities in units, a tendency to interrelate with users on a very personal level, influenced the general style and approach to instruction the librarians/information officers viewed as desirable.

Now in spite of a tendency for librarians to exaggerate their activity in user education (that has been my experience), the survey seems to indicate much more user education in special libraries than I had anticipated. The bulk of what is done, however, is in library orientation or as someone has recently described it, library instructions. User education for me is much more than this and in the special library sector there is every reason to expand it to take in the definitions I gave at the beginning.

Catherine Sullivan's study showed that user instruction had probably increased considerably in the last decade. I wonder what is likely to improve this situation in this area in the next decade.

Stimuli to user education in special libraries

I think the appearance of new bibliographical tools and other secondary and tertiary services, and their acquisition by the special library, might well provide the stimulus for more user education in special libraries. The services I have particularly in mind are the growing number of data bases which are accessible by on-line searching.

In on-line searching it is difficult to discern which approach will eventually find most favour, but the trend for the moment seems to be that more effort is going into the training of intermediaries (that is, library and information personnel) rather than the end-user (that is, the user of the library's resources and services). The reasons generally are economy of time and money. The end-user may not have the time nor the inclination to be trained. It is cheaper to have an experienced intermediary doing the searching rather than letting a number of (initially at least) inexperienced end-users waste expensive computer time. After all, the end-user may require to make relatively infrequent on-line searches.

So teaching the techniques of on-line searching (that is the mechanics of searching and the details of the system) may not be the role that the staff in special libraries will have to play. It may, however, be a related role, like making the library user more aware of the difficulties of the data bases when computer searching. Because even if the intermediary does the actual searching he or she needs the assistance of the end-user in, for example, the formulation of the inquiry and this requires a knowledge by both of the scope, structure and indexing practices, and of the problems of the data base. These days there is such a multiplicity of data bases that the intermediary cannot hope to be expert in all he or she has access to, and the end-user will need to have some knowledge of them, hence some instruction. So there is some scope for user education here and it may stimulate further user education in other parts of the library and information service.

Of course, this educational role in the on-line searching area need not and perhaps cannot be done by the special library staff for their own users. And who better to do this than the system operators and data-base producers themselves. There is growing activity in this area and it is worth mentioning.

I will not consider the training offered by the system operators. This is by and large aimed at the intermediary and not at the end-user. Rather I will deal with the courses of instruction offered by the data-base producers. Here I must confess to a suspicion that user education in this context is a euphemism for a sales/promotional/marketing exercise. In some cases the prime reasons for running a user education course are commercial rather than educational; but my background in the aggressively non-commercial world of higher education is perhaps at fault for this sentiment. After all what is user education but an attempt to sell and promote a range of library services and sources. These data base producers are, however, training the user in just one service—their own.

Be that as it may, a number of the giants of the information business are offering courses now, and many of them run extensive programmes. INSPEC, Engineering Index Inc. and UKCIS are but three, with the last extremely active. The aim of these enterprises is primarily to teach the *end-user* the scope and use of their products, but actual surveys of the participants of some of the courses indicate that in the majority of cases it is not the end-user that attends the course but the librarian or the information officer. One can suggest reasons for this.

One of the reasons is undoubtedly that the courses are expensive, even when one excludes computer time. Even the well-endowed industrial libraries cannot afford to send all the non-library personnel that may need the service. It is much cheaper to send the intermediary and bring him or her back to train the end-user. Aware of this, some of the data base producers are now prepared to bring the course to the institution at much reduced cost to this institution.

But another reason is that the end-user is not concerned or has not the time to be taught the use of the service and this I would think is a stronger reason. 'After all why do we employ information personnel', they say.

As a point of interest these courses seem, according again to the surveys I have studied, to be very much the preserve of special library personnel. Academic personnel, both from the libraries and the faculties, generally account for less than 5 per cent of the attendees. The reasons here are not important but cost, I suspect, is one big factor and another possibly related factor could be that the academic is slow to catch on to the new techniques of information retrieval.

Information retrieval by computer then, obviously lends itself to user education. It concerns mainly the bibliographic instruction aspect of user education. This, along with the library orientation that I referred to in Catherine Sullivan's study, is the traditional sort of user education.

I am still unsure but I think that special librarians should be involved in a sort of user education that is even broader—something that includes communication skills. There is evidence in some subject areas that this broader user education or as I like to call it, information awareness or information consciousness is being encouraged among information users whose main information support is the special library. I find it difficult to articulate what I mean by information consciousness but perhaps an example or two will help.

Communication and study skills and a further justification for user education in special libraries

Some twenty years ago, in 1957, the Russians launched their first sputnik. The Americans were taken by surprise, because they did not think that the Russians had the technical capability to succeed in such a venture at that time. However, this surprise turned to dismay and annoyance when they discovered that the necessary technical developments had already been described in the Russian scientific literature and they could and should have therefore anticipated the launching. The work had been overlooked. Part of the reason was that the work had not been translated into English and thereafter there was a frantic rush into the cover-to-cover translation of Russian scientific journals.

Now one might say that in this instance a number of industrial and government librarians in the USA should have shouldered the blame for not bringing this work to the notice of their clientele. I do not think this was even suggested but anyway the charge is unreasonable. One could make a reduced charge and say that the librarians should have alerted the scientists, etc., to the need for improved access to Russian scientific and technical literature. This is not a normal function of librarians, but when one thinks about it there is every reason it should be.

Some of the fault could be laid at the door of the American intelligence agencies. But to my mind much of the blame rests with the scientists and technicians themselves for their unawareness and in this case for their poor appreciation of the potential of ordinary information readily available in the literature. Now you may argue that it is very much part of the librarian's and information officer's job to make their clientele aware of current published literature, but one can only take this so far. A considerable information burden remains with the user.

Lack of knowledge of sputnik technology by the Americans, though deflating, was nevertheless harmless. Some years later in the late sixties and the early seventies several harmful situations occurred which could have been avoided had there not been information ignorance and neglect, and more especially poor communication. This applied to two areas especially—medicine and the construction industry—and examples were the thalidomide cases and the box-girder bridge collapses. Ignored information and poor communication were not entirely responsible for these disasters but they made a sizeable contribution.

The medical world and the construction industry are similar in several respects. The structure of both comprises a number of layers of people who, though their intellectual levels may vary quite considerably, are extremely interdependent. In the medical field, we have doctors, nurses, hospital administrators, drug manufacturers, etc. In the construction industry, we have architects, civil engineers, site foremen, bricklayers, etc. It is vital that there is efficient information handling and information transfer, and clear communication at all levels and between all levels.

In the two cases I have just mentioned, that is, thalidomide and box-girder bridges, I think again that little blame can be attached to the librarian or information officer. If I were to say that we were blameworthy then it is that we as librarians and information officers did not and do not make our users sufficiently information conscious. Special librarians I think have a special responsibility to do this because it is they who provide information services to non-academic scientists, engineers, civil servants, etc., who are the major part of the medical world, of the construction industry, of government, and whose decisions are influential and vital. I do not think it is going to be achieved by library orientation and bibliographic instruction alone. In fact the special library user should have had all this at university, polytechnic and school. What should be left to the special librarian, apart from some initial library orientation and some remedial work on information sources, should be efforts to make his or her clientele more information conscious.

Something is currently being done, albeit in a small way, and I would like to give you two examples. One is from the medical world and one is from the construction industry. One involves a special library service and the special library sector as much as any other.

Wessex Regional Library and Information Service

The first example is Wessex Regional Library and Information Service, a special library or rather a collection of special libraries in the Wessex region of the National Health Service. The staff of the Wessex Regional Library and Information Service have organized instructional sessions for various professional groups on how to use libraries—to explain how the regional library service operates and how it can be used to get access to the 'total system of knowledge' as they say. But just as important, it is intended to illustrate the general concepts of information and its methods of handling within and without a library.

The initial stimulus for this instruction was and still is the great range and scatter of the National Health Service staff that the library serves. The scatter makes it difficult for librarians to reach these library users. And to illustrate the range of use I need only mention anaesthetists, dieticians, general practitioners (on vocational training), nursing tutors, pharmacists, rehabilitation staff and administrative staff as some of those who have benefited from the instruction. Few of these would be regular library users so they need to be made fully aware of the potential of the library and information services in the region, and the value of information and the importance of good communication of information in general.

Department of Architecture and Building Science

The second example relates to the construction industry. In discussing this I am possibly stretching the special library context. The project is being run from the Department of Architecture and Building Science at the University of Strathclyde and is entitled 'User education in the construction industry; the development and promotion of a comprehensive teaching framework for information management as an integral part of construction course curricula.'

The work is still at the late planning stage and although the teaching framework will appear as a unit in a course for construction industry people at universities and polytechnics, it is also being aimed at people already in industry, and consequently it is likely to involve special library staff in the industrial and government sector at least.

Three levels are being aimed at—the professional level, the technician level and the support level (that is, accountants, lawyers, secretaries, etc.)—and the emphasis in the syllabus is on the skills related to the communication of information rather than retrieval from information sources. It is impossible for me to go into any detail of the syllabus but I will outline the first section of it, from which the other sections stem. It is headed 'The building process and information flow'. This includes 'the nature of the building (design/construction) process in general, and its functions, procedures and routines, in the context of the structures of the construction industry'. The building process as an information system and the information functions of its procedures and its participants.

One small, but I think significant, point about this project is that it is being funded, not by the British Library, but by the Department of Environment. This is an indicator of the recognition that information use is not simply a library problem.

Conclusion

Over the past few years there has been a lot of talk of libraries in various sectors missing the boat in providing a service or a special type of service to their public. Librarians in public libraries failing to provide community information services is a notable example, where cornershop information bureaux stepped in to fill the gap. Librarians and user education could be our next failure. And again there are a number of groups beyond libraries moving in to cover our lapse, *e.g.* UKCIS, the Department of Architecture and Building Science at the University of Strathclyde and the Department of Environment.

This is not necessarily a bad thing; any attempt to improve the information handling ability of users is to be applauded. We nevertheless should be giving a strong hand in this and, in some instances, lending balance. In on-line user education, for instance, I think it is unwise to leave user education entirely to the information giants. Concentration on one particular information source or service is not user education but simply marketing. When not to use that source and perhaps choose a whole range of alternative sources, *is* user education and this function should be the role of the librarian.

Many special libraries stress how important it is that they deliver the information to the user really swiftly. There have been times and there will be times when not just the information is too late but the question itself is too late in being asked, and perhaps never even anticipated by the librarian. Everyone, not just librarians, must these days be a good information retriever, organizer and communicator. The essential expertise we have acquired as librarians should be passed on and in the special library sector there is possibly an urgency that is not so obvious in other sectors.

The role of minicomputers in libraries and information units

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Paper presented at the Joint Annual Conference of the Aslib Midlands Branch and Northern Branch, Llandudno, 4th–6th May 1978

Introduction

OVER THE PAST FEW YEARS considerable interest has been shown in the use of computers for library and information retrieval applications. Despite this interest surprisingly little practical development has been carried out particularly in the smaller institutions. The reasons for the lack of implementation are many but some of the more major reasons are:

—cost and availability of hardware
—lack of readily available applications software packages
—cost of developing own specification software
—cost of converting data, especially back files.

With the advent of the powerful low-cost minicomputers, libraries and information units were offered a solution to the first problem but they are still faced with the high cost of adequate software and data conversion.

The first part of this paper is concerned with minicomputers, what they are and how much they cost. In the second part, consideration is given to the types of systems required in libraries and information units and the availability of suitable software packages.

In the past few years a new term has crept into the computer vocabulary: 'microprocessor'. Microprocessors are computer processing units which with modern microscopic electronic manufacturing techniques can be contained with its control circuitry on a single ten inches by 5 inches circuit board. At the present time most microprocessors are bought by people with sufficient knowledge of electronics to be able to build them into useable configurations. Some microprocessors are now coming on to the market as easy to use as any minicomputer. For this paper it has been assumed that a microprocessor has similar attributes to a small minicomputer.

Minicomputers and their relationship to mainframes

The electronic computer had its practical foundations in the years of the Second World War when a number of electronic devices were developed for such tasks as deciphering enemy messages. Many early devices were operating

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under hardwired program control and it was not until the early post-war years that the stored-program computer started to become practical. The early computers were very expensive and hence thought to be usable in a very limited number of applications.

In 1960 Digital Equipment Corporation introduced the first commercial minicomputer, the PDP-1. The PDP-1, though dubbed the first minicomputer, still required four freestanding, six-foot high cabinets for its processor and storage. Its descendant, the DEC LSI-11 microprocessor, is contained on a single board ten inches by five inches. Despite its size the PDP-1 was the machine which started to allow computer facilities to be brought right into the laboratory. It was in the field of scientific applications that the minicomputer first made its mark and it is only in the past four to five years that minicomputers have been considered seriously for commercial applications.

One of the persistent difficulties facing commentators on the computer industry over the years has been trying to define the difference between minicomputers and 'traditional' mainframe computers. Far from getting easier the definition is getting harder all the time with minicomputer manufacturers introducing more powerful and sophisticated machines.

It has been said by a number of computer experts that 'minicomputers are a state of mind'. By this they mean that it is impossible to define a series of quantifiable factors which distinguish minicomputers from mainframes and that the computer expert knows instinctively which category a particular computer is in.

However, for the layman, this is not acceptable and in the following broad comparison, the differences are considered under a series of headings:

—physical size
—computing power
—peripherals
—software
—operating
—environment
—maintenance
—availability
—price
—effects.

Under almost all of these headings the differences are indistinct when comparing large minicomputers with small mainframes and in many cases there will be a margin of overlap.

Physical size

A minicomputer is usually small with its processor and all but its largest peripherals mounted in nineteen-inch wide racks. The peripherals on minicomputers are generally smaller than their counterparts on mainframes.

The floor space requirements vary considerably depending on the configuration; an area 12 feet × 10 feet will contain a large minicomputer configuration. Despite their small size, the weight of a minicomputer and the resultant floor loading should not be underestimated. Mainframes are usually large, occupying multiple free-standing tall cabinets. Peripherals are generally mounted in individual free-standing cabinets.

Computing power

The performance of any computer system is dependent on three factors:

—how well it has been designed and programmed
—the efficiency of the manufacturer's (or other supplier's) system software
—the power and suitability of the computer.

The first factor is obviously under the direct control of the user or his contractor. The second factor will be discussed in the section on software.

Despite various attempts to define a unit of computing power based on theoretical mixes of instructions, there is no real measure of 'raw' computing power. A good processor for one application may be highly unsuitable for another. There are many elements of processor architecture which affect the suitability for specific applications including:

—size and type of memory
—word length
—cycle time
—memory addressing system
—number and size of registers and/or accumulators
—number and type of instructions
—pipelining or other instruction anticipation
—multi-programming capability
—virtual storage capability
—peripheral connection.

Large minicomputers very often have 'raw' computing power which seems equivalent to that of small to medium mainframes but which is far harder to utilize fully. For bibliographic applications the two most important elements are probably the number and type of instructions and peripheral connection.

Minicomputers tend to have smaller instruction sets than mainframes and the capability of the instructions is frequently more limited. For bibliographic use sophisticated arithmetic facilities are less important than good character-string handling instructions.

Transfer of data to and from the peripherals is generally slower on minicomputers which usually have a single data transfer channel than with mainframes on which parallel multichannel input/output is normal.

Although there is a trend for new large minicomputers to have a 32-bit word length, the majority of the current ranges of minicomputers have a 16-bit word length allowing two characters to be represented in each word. Since memory addressing tends to be related to word length, these minicomputers can only directly address up to 64K and addresses above this require indirect addressing which slows down the throughput of productive work. Mainframes on the other hand can frequently address four megabytes without indirect addressing.

256K words (512K bytes) is a common maximum memory size for mini-

PERIPHERAL	MINICOMPUTER	MAINFRAME
Card reader	*	*****
Paper tape reader	***	**
Line printer	***	*****
Character printer	**	—
Magnetic tape	**	*****
Magnetic tape cassette	**	—
Diskettes	**	—
Disks	****	*****

Key: Asterisks indicate relative availability and use. (*i.e.* * = rarely used, ***** = almost always used)

TABLE 1: *Availability of peripherals*

computers whereas mainframes can go to four megabytes of real memory or sixteen megabytes including virtual storage.

Peripherals

Although peripherals connected to minicomputers are slower and less sophisticated, the range of peripherals likely to be connected is greater than for a mainframe. Table 1 shows the types of peripheral available for mainframes and minicomputers.

Software

The system software can be considered under three headings: operating systems, programming languages, programming aids, etc.

The operating system is the control program, usually supplied by the manufacturer, which co-ordinates the processing carried out by the computer. On mainframes the operating system is usually general purpose, supporting multiprogramming and having sophisticated job control facilities.

In many cases the software required to control an on-line program is separate from the operating system. Many minicomputers have available a range of small specialized operating systems and sometimes a larger, general-purpose one but without complex batch job control facilities. It is very rare for the on-line control software to be separate from the operating system; minicomputers are basically on-line computers.

Although the range of programming languages on minicomputers is becoming more comparable with that on mainframes, the usefulness of a language is dependent not only on the presence of a compiler but also on the language features implemented, diagnostic aids, efficiency of code produced and speed of compilation. Frequently the level of compiler facilities are lower on minicomputers with fewer optional features implemented, limited diagnostic aids and no optimization of output code. The relative availability of programming languages is shown in Table 2.

Under the heading programming aids are included such software items as Data Base Managements Systems, Test Harnesses, Utilities (*e.g.* Sort, Merge),

	MINICOMPUTERS	MAINFRAMES
Assembler	****	****
ALGOL	**	***
BASIC	****	**
COBOL	***	****
FORTRAN	****	****
PL/1	*	**
Real time languages (*e.g.* CORAL RTL/2)	**	*

Key: * = available on a few ranges
** = available on some ranges
*** = available on most ranges
**** = available on almost all ranges.

Note: availability includes languages from independent suppliers.

TABLE 2: *Relative availability of programming languages*

Specialized Sub-Routines (*e.g.* Statistical Analysis, PAYE) and Applications Packages.

On the whole the programming aids are less sophisticated or less available on minicomputers, although in certain categories (notably Data Base Management Systems) the situation is rapidly changing.

Operating

In general minicomputers are simpler to operate than mainframes. This is mainly due to:

—fewer control buttons and switches, often little more than an on/off switch
—operating systems are simpler and specialized, selected for relevance to the application
—peripherals are fewer and less sophisticated
—minicomputers are often dedicated to single applications running for long periods without operator intervention.

This means that on minicomputers the operator can undertake other duties, operating the computer only when required to change paper, etc. Frequently the operator may be the office supervisor or the senior terminal operator. Because of the ease of operation the operator requires only a short, but important, period of training.

On mainframes the interaction is fairly high, requiring two or more full-time operators each requiring extensive training.

Environment

The environment in which a computer is placed is important for reliability and acceptability to the users.

Mainframes are housed in special computer suites with full air-conditioning and false flooring. The cost of setting up a computer suite can cost £25,000–£150,000 or even more. Minicomputers, however, can frequently utilize ordinary office accommodation, though some larger ones need extra facilities. The smallest minicomputers do not need any air-conditioning except perhaps forced ventilation in summer. A medium-sized one would require an industrial fan costing about £1,500 and a large one would need unsophisticated air-conditioning costing about £7,000.

False flooring serves to spread the weight of the equipment and to cover cabling, removing it from sight and from the feet of staff; few minicomputers are installed with false flooring.

For its power supply a mainframe will need a 30-amp, 3-phase supply connected through voltage regulators. Minicomputers, especially small and medium ones can be run on a standard 13-amp ring main, although it is advisable to ensure that the circuit does not also serve equipment liable to large usage fluctuations. Larger minicomputers and disks may need a 3-phase power supply. In an office or library environment the problem of noise from even a minicomputer must be recognized. Screening should be placed around the noisier equipment such as printers and card readers.

Maintenance

Computers consist of two types of equipment: electronic circuits such as the central processor and electro-mechanical devices such as printers and disk drives. The reliability of modern electronic circuitry is very high and that of electro-mechanical is good but dependent on usage. Minicomputers often have maintenance agreements which cover failures plus monthly or three-monthly preventative maintenance checks, whereas mainframes often have weekly preventative maintenance checks. The prime reason for this is the difference in the relative quantity and use of the equipment. Maintenance may be arranged either with the manufacturer or a specialist computer maintenance company.

The cost of a maintenance contract on computer equipment is typically around 10 per cent but depends on the frequency of preventative maintenance and degree of cover required. A guaranteed one hour engineer response twenty-four hours per day, seven days per week will cost significantly more than a four-hour response during normal working hours.

System software is generally very reliable, although this may deteriorate immediately after the first issue of a new version. With applications software, the initial reliability may be lower until all facilities have been thoroughly exercised. It is quite usual for contractors to provide a six-month warranty on software, maintenance beyond that being subject to negotiation. If the applications software is a package rather than purpose written it may be subject to a standard on-going maintenance contract with automatic issue of new versions of the package.

Availability

Mainframes can in general only be obtained new, directly from the manufacturer and leasing organizations. In most respects the lessee gets the same service from the manufacturer whether the computer was obtained direct or through a leasing organization.

Minicomputers can be obtained from three main sources:

1. Manufacturers; some still prefer to deal with 'system packagers' and systems houses rather than end users,
2. 'System Packagers'; these organizations buy from one or more manufacturer and build a range of standard systems which they sell as packages. They do not usually tailor these packages to the specific needs of an end-user,
3. Systems Houses; these organizations take full responsibility to design and implement systems to the user's specific requirements; they buy the hardware from the most suitable manufacturer(s).

In addition to computer manufacturers minicomputer peripherals are readily available from specialist peripheral suppliers. Except for terminals it is generally unwise for the non-technical end user to buy from these suppliers without expert advice.

Maintenance of minicomputer systems can usually be arranged either with the processor manufacturer or one of the specialized maintenance organizations. The latter are likely to be particularly applicable for mixed-supplier systems although some large manufacturers may be prepared to maintain the complete system provided they had supplied the major part.

Prices

The cost of a small mainframe processor is rarely much below £100,000 and powerful processors can range from £500,000 to £2,000,000. Small to medium minicomputer processors cost between £2,500 and £25,000 and even the largest processor would cost only around £50,000.

The cost of additional memory for a processor does not differ much per byte between minicomputers and mainframes. However the increment of memory that must be purchased can be as low as 8K bytes at a cost of around £1,000 for a minicomputer whereas the smallest for a mainframe might be 256K bytes at around £30,000.

Since peripherals connected to minicomputers are usually slower and less sophisticated, they create the illusion that minicomputer peripherals are less expensive. Where peripherals of similar capability and sophistication are available the prices are similar.

Different manufacturers have different pricing policies; some charge relatively more for their processors and less for their peripherals or vice versa. Some manufacturers charge separately for every item of software, this is called unbundling; others will include the more essential items such as the operating system and one compiler in the price of the processor. Price comparisons should only be made on complete specific configurations and even then allowance must be made for the relative cost of any peripheral type which may be increased in number later.

Table 3 shows the prices and configurations for four minicomputer systems. All the figures quoted are estimates and should not be used as the basis of any budgetary or sizing exercise.

MINICOMPUTER	PRICES (£)
Processor+ 32KB Memory 2 Diskettes (256KB each) 1 Terminal System software	8,000–14,000
Processor+ 64KB Memory 5–10 MB Disk 1 VDU terminal 1 Printer System software	15,000–25,000
Processor+ 96KB Memory 20–40 MB Disk 4 VDU terminals 1 Printer System software	37,000–47,000
Processor+ 128KB Memory 160–200 MB Disk 8 VDU terminals 2 Printer terminals 1 Printer 1 Magnetic tape System software	90,000–110,000

TABLE 5: *Sample minicomputer configurations and prices*

Effects

Many organizations have been able to justify the acquisition of dedicated minicomputers for specialized systems because of their relative cheapness and ease of use. Had the organization not been able to get its own minicomputer it would have had three main options:

1. to compete for time on any corporate mainframe computer,
2. to buy computer time from a commercial bureau,
3. not to computerize the application.

So, frequently, have minicomputers been dedicated to a single application that some people have erroneously defined minicomputers as dedicated machines.

The architecture and the availability of peripherals favour the use of minicomputers for on-line applications rather than batch operation. Because of this and the fact that the minicomputer is often directly under the control of the user department, the minicomputer generally is more accessible and offers a faster turn-round of work.

Having the minicomputer under its own budgetary and organizational control the user department is able to make its own decisions on upgrading the configuration.

Applications and software

Applications

There are many applications within libraries and information units which potentially could show some benefit from computerization. These benefits may be tangible ones such as savings in staff or costs, or they may be intangible in the form of additional or improved services achieved without any increase in staff numbers.

The major applications areas are:

(a) cataloguing
(b) information retrieval
(c) index production
(d) circulation control
(e) acquisitions control
(f) administration.

These applications should be familiar to most readers and the following points have been included to highlight specific aspects of computerization.

Cataloguing. This is the task of recording, indexing and entering the data into the computer system. It is crucial to the success of the next three applications. The library may decide to catalogue all its data from scratch or may be able to take advantage of machine-readable data from such external services as the British Library's MARC, INSPEC or the Commonwealth Agricultural Bureaux. This data is available on magnetic tape in an international standard format (ISO 2709).

Information retrieval. This is the task of carrying out subject searches on the catalogue. This may be an *ad hoc* search on the complete catalogue (retrospective searching) or a regular search on the latest additions to the catalogue (SDI). Information retrieval may be implemented on the computer for on-line interactive searching with facilities to refine searches whilst they are in progress or in (off-line) batch mode. In the latter case searches can only be refined by modifying them and submitting the complete search.

Index production. This is the production of hard-copy indexes. Even within a highly computerized library there is still usually some need for printed indexes. These might include accessions lists or catalogue cards for use within other libraries within the same organization and current awareness lists for circulation. The indexes might be computer line printer output typeset or COM (computer output on microfilm) depending on the frequency, quality and volume required. .

Circulation control. The control of the loan of material is crucial to the efficient running of a library. In addition to recording actual loans and returns, the system must provide facilities to maintain a register of borrowers, print/display details of overdue loans and print/display the details of the current borrower of an item. In a small library the loans and returns may be handled via a keyboard terminal or off-line batch recording, in larger libraries specialized data recording equipment such as bar-code readers may be required. These data recording devices usually incorporate a micro- or minicomputer which is capable of handling facilities for reserved books and cancelled readers tickets; however, they are not generally user-programmable and cannot be used for other purposes.

Acquisitions control. This is the function of ordering books and journals and ensuring that items are delivered. With books this is generally a simple purchase order system, but for journals, facilities are required to ensure that all issues are received. With careful design of the system it is possible to use the data input for acquisitions purposes (title, author, publisher, etc.) as an embryonic cataloguing record.

Administration. The administration requirements vary considerably with the size and type of library or information unit. Some may only require statistical analysis of library usage whereas others may require quite comprehensive accounting facilities.

Software availability

Programs for these applications may be available as a package from a supplier or it may be necessary to develop them from scratch. If a package is available it is likely that it will need modifications to meet the specific requirements of the library. The supplier may undertake to carry out these modifications probably at an additional cost or may expect the purchaser to take responsibility for the changes. The availability of library automation packages is unfortunately low on minicomputers and little better on mainframes. Where packages exist they tend to be machine dependent although there are some notable exceptions such as AERE Harwell's STATUS information retrieval package.

There are at present only three readily available information retrieval system on minicomputers: CAIRS, FACTFINDER and STATUS; although a minicomputer version of ASSASSIN is believed to be under consideration. Each offers fairly comprehensive subject retrieval facilities but the cataloguing and index production facilities vary considerably from system to system. In some cases major enhancement may be necessary in these areas.

Packages in the other applications are almost non-existent although commercial applications packages *might* be adaptable (*e.g.* a purchase control system for acquisitions).

Choosing between manual and on-line searching—practical experience in the Ministry of Agriculture, Fisheries and Food

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Paper presented at the Joint Annual Conference of the Aslib Midlands Branch and Northern Branch, Llandudno, 4th–6th May 1978

Introduction

AT THE BEGINNING of the 1970s it became apparent to the Ministry of Agriculture, Fisheries and Food that the use of computers for information work merited serious consideration. We had taken part in investigations which indicated that the technology was well developed and reliable. We knew that large scale commercial services were available. What we did not know was the real value of these external services to the Ministry. All the databases concerned were derived from very familiar printed secondary journals. Did mechanized operation offer substantial advantages? Was the cost justified? How could mechanized operations fit into the present library activities? If the use of computers did offer improved facilities, what administrative arrangements were necessary? It was decided, therefore, to attempt to answer these questions by the evaluation of external computer-based bibliographic information services under practical conditions.

To evaluate on-line retrospective searches we used the databases in their printed form as the standard against which mechanized searches were judged. We studied seventy-five searches by doing all of them on-line and manually. All searches were carried out as a result of real requests for information received by the Ministry's libraries and information services. The seventy-five searches were selected to cover a cross-section of the Ministry's interests.

Retrieval performance evaluation was based on the enquirers' reactions, each enquirer being asked to evaluate both on-line and manually produced lists by indicating which items were of value.

For the on-line searches we used the Lockheed Dialog and Medline services, the latter initially as part of a British Library Research and Development Department investigation; Medline is now used through BLAISE.

Further details of the experiment have been published.[1] In summary, it was found that on-line searching took about one-sixth of the time of a manual

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A BIOSIS

570 16525

EFFECT OF SEED SIZE UPON GERMINATION MOISTURE UPTAKE SEEDLING GROWTH DRY WEIGHT CHANGES AND SOLUBLE SUGARS UNDER POLY ETHYLENE GLYCOL INDUCED STRESS

PANDYA R B; KHAN M I; GUPTA S K; DHINDSKA K S
BIOCHEM PHYSIOL PFLANZ (BPP) 164 (1). 1973 80–87. Coden: BPPFA
Descriptors: BRASSICA-CAMPESTRIS
Concept Codes: 10011, 10060, 10068, 5100, *51502, *51510, *51512, 51520, 52514
Biosystematic Codes: 25880

B. BIOLOGICAL ABSTRACTS

1 BASIC SUBJECT INDEX

M-VULGARE KINETIN 1AA	GERMINATION	MEDIUM AUXIN METAB	39840
PRUCIANA MORPHOLOGY		MEDIUM/STUDIES ON T	35723
RVENSE INULIN CONTENT		MOISTURE REGENERATIV	35133
*ECT OF SEED SIZE UPON		MOISTURE UPTAKE SEED	16525
RNA BIOSYNTHESIS SEED		MORPHOLOGICAL CHAN	39615
UV IRRADIATION CONIDIA		MORPHOLOGY NUTRITI	57339

+372 other 'GERMINAT?' entries

2 BIOSYSTEMATIC INDEX

DICOT CRUCIFERAE	PL TRANSLOC	16504
DICOT CRUCIFERAE	PL TRANSLOC	22506
*DICOT CRUCIFERAE	PL WATER REL	16525
DICOT CRUCIFERAE	PL WATER REL	34291
DICOT CRUCIFERAE	PORPHYR STU	23740

+500 other 'CRUCIFERAE' entries

3 GENERIC INDEX

BRASSICA CAMPESTRIS	AN PROD FEED	11773
	CROPS OIL	17649
	CROPS OIL	23460
	CROPS OIL	29228
	CYTOL PLANT	12804
	DICOT SYST	12220
	DICOT SYST	59027
	GENET PLANT	25676
	PL CHEM CNST	27983
	PL CHEM CNST	28021
	PL DIS FUNG	62960
	PL DIS FUNG	68724
	PL DIS FUNG	68727
	PL DIS MISC	4714
	PL DIS MISC	63015
	PL DIS OTHER	16207
	PL DIS OTHER	45558
	PL DIS PHAN	4706
	PL ENZYMES	39786
	PL METH APP	39705
	PL PHOTOSYN	22432
	PL PHOTOSYN	28209
	*PL WATER REL	16525
	VEGETAB HORT	54886

+145 other 'BRASSICA' entries

FIG 1: *Comparison of* BIOSIS *computer record with* BIOLOGICAL ABSTRACTS *printed indexes*

search of the printed version of the same database, and that the on-line searches cost much the same as the staff costs for manual searching. But the result which interested us most is that when searches on the same topic are carried out using the computer-readable and printed forms of the same database, the references retrieved are often different. This fact led us to investigate further the different processes involved in searching manually and by computer.

Differences between the printed and machine-readable forms

In searching, one has to match the concepts of the search subject to the terminology of the entry points or searchable elements of the database. The match between concepts and entry points determines the quality of the search results. What are these entry points? They divide roughly into uncontrolled and controlled vocabularies.

Typical uncontrolled vocabularies are title words, abstract words and free-language indexing. These are flexible and hospitable to new terminology. However, the richness of the English language means that many concepts require a large number of free-language terms to express them adequately, that is the terminology is scattered. Frequently, acceptable compromises can be reached, but occasionally the terminology is so scattered that low recall is inevitable.

Typical controlled entry points are thesaurus-based indexing, narrow codes and broad codes. Narrow codes are like thesaurus terms, but their notation may give the facility for easy hierarchical searching. Broad codes are distinguished by the large number of items allocated to them. Controlled indexing is rigid—the concept required must be included in the vocabulary if the vocabulary is to be of any help in searching. In some cases, many narrower or related terms may need to be searched, especially if a generic concept is required, making the vocabulary of limited aid to the searcher. Occasionally, the vocabulary will be totally incapable of expressing the required concepts. However, the strong point of any controlled vocabulary is its potential to reduce the number of search terms required to express a concept which fits the vocabulary's philosophy.

Frequently, the entry-points available in the machine-readable form of a database are not of the same type as those commonly used in the printed version, leading to different search results. Not only does the machine-readable form often have more types of entry point available, but the computer can co-ordinate between different types of entry point regardless of their position in the record. One big disadvantage in some searches is that the terminology of all necessary search parameters must be specified.

As well as often having fewer types of entry point to search, the manual searcher is also constrained by the physical format of the printed indexes. As his eyes and brain can only be in one place at a time, he can only easily co-ordinate between terms visible in one place. However, he does not have to specify all the search parameters—he can interpret the information given under one entry point to identify possible candidate references. This power of interpretation is the manual searcher's strongest point. He can, however, only scan a limited number of items.

	MANUAL	ON-LINE
Database	*Biological Abstracts/ Bio Research Index*	BIOSIS
Number of pertinent references retrieved	5	9
Formalized search strategies	'Insecticides' (full titles and enrichments) AND 'Heat' (interpretation of partial titles and enrichments) OR 'Heat' (full titles and enrichments) and 'Insecticides' (interpretation of partial titles and enrichments)	'Insecticides' (full titles and enrichments) AND 'Heat' (full titles and enrichments)

FIG 2: *Search title: Effect of temperature on the efficiency of insecticides*

Figure 1A shows a BIOSIS record as held in the Lockheed Dialog system. This reference was rated as of major value in response to a request for information on the germination of brassicas. It was not retrieved by a manual search of Biological Abstracts. Figure 1B illustrates the index entries for this item (Volume 57, abstract 16525) in the printed source. Those referring to the reference in question are marked with an asterisk. It is evident that the information given about this reference at any one place in the printed index does not enable the manual searcher to co-ordinate between the concepts 'germination' and 'brassica', which combination so readily retrieved the reference on-line. The manual searcher was constrained by the physical format of the indexes, together with the high number of items listed under each entry term, whereas the physical position of the required entry terms was immaterial in the on-line search.

Examples

To illustrate these points, eight searches taken from the seventy-five studied are discussed below. Failure analysis enabled the reasons for the differing recall of pertinent references to be determined. In the figures, formalized versions of the search strategies are given in terms of the titles of the parameters involved. The numbers of pertinent references retrieved are shown, but it should be stressed that the searches were treated as case studies and that the differences in search results are not necessarily statistically significant. The importance of the numbers is solely that they led us to investigate further the different processes operating during manual and on-line searching.

Figure 2 gives details of a search where the type of entry point was the same for both procedures, involving title words and free-language indexing. 'Insecticides' was difficult to express in free language, as all specific insecticide names could not be used, but this disadvantage was the same for both searches.

	MANUAL	ON-LINE
Database	*Chemical Abstracts*	*Chemical Abstracts Condensates*
Number of pertinent references retrieved	48	193
Formalized search strategies	'Food analysis' (general subject index) AND 'Atomic Absorption' (interpretation of free-language modifiers) OR 'Atomic absorption' (general subject index) AND 'Food' (interpretation of free-language modifiers)	('Food' (titles and keyword phrases) OR 'Food' (section code)) AND 'Atomic absorption' (titles and keyword phrases)

FIG 3: *Search title: Atomic absorption spectrophotometry for food analysis*

What caused the manual searcher to miss references was the physical constraint of the printed BASIC index, which is a KWIC index with a restricted line length. This means that although the entry term could be located anywhere within the titles and enrichments, the manual searcher could only feasibly co-ordinate between it and those terms adjacent to the entry term. The physical position of the terms was immaterial in the computer search, hence its higher recall.

In the search shown in Figure 3, different types of entry point were used for the two procedures. The manual searcher used the volume indexes of *Chemical Abstracts*—essentially controlled indexing. However, the concepts of the search were not easily expressed in terms of this because of Chemical Abstracts Service's policy of indexing analytical papers under the chemical compounds being analysed—this meant that the terminology was very scattered. However, 'atomic absorption' could be easily expressed for free-language computer searching and was often mentioned in the titles and keyword phrases. The computer could search the foods section, which was too bulky to scan manually, and the code for this section was very helpful to express what was almost impossible in free-language. *Chemical Abstracts Condensates* was therefore much more useful, and gave higher recall.

Again, in the search shown in Figure 4, the BASIC index imposed physical constraints because of its restricted line length. Another disadvantage of the manual search was the fact that 'bacteria' was difficult to express—the BIOSYSTEMATIC index cannot be easily co-ordinated with title words, and all specific bacteria names could obviously not be used. The searcher had to infer the 'bacteria' parameter from the terms adjacent to the 'aerial surfaces' entry terms. However, the computer search could easily co-ordinate between the BIOSYSTEMATIC codes and 'aerial surfaces' words anywhere in the titles and enrichments, giving higher recall once again.

As in the 'atomic absorption' search, the topic of the search in Figure 5 was difficult to fit into the *Chemical Abstracts* indexing policy of specificity. Proteins

	MANUAL	ON-LINE
Database	*Biological Abstracts/ Bio Research Index*	BIOSIS
Number of pertinent references retrieved	35	47
Formalized search strategies	'Aerial surfaces' (full titles and enrichments) AND 'Bacteria' (interpretation of partial titles and enrichments)	'Aerial surfaces' (full titles and enrichments) AND 'Bacteria' (BIOSYSTEMATIC Code)

FIG 4: *Search title: Bacteria on plant aerial surfaces*

	MANUAL	ON-LINE
Database	*Chemical Abstracts*	*Chemical Abstracts Condensates*
Number of pertinent references retrieved	17	127
Formalized search strategies	'Proteins' (general subject index) AND 'Modification' (interpretation of free-language modifiers)	'Proteins' (titles and keyword phrases) AND 'Modification' (titles and keyword phrases)

FIG 5: *Search title: Modification and separation of proteins*

	MANUAL	ON-LINE
Database	*Index Medicus*	Medline
Number of pertinent references retrieved	13	28
Formalized search strategies	'Porphyria' (MESH thesaurus print terms) AND 'Pesticides' (interpretation of full titles)	'Porphyria (all MESH thesaurus terms) AND 'Pesticides' (EXPLODE all MESH thesaurus terms)

FIG 6: *Search Title: Induction of porphyria by pesticides Manual*

	MANUAL	ON-LINE
Database	*Bibliography of Agriculture*	AGRICOLA
Number of pertinent references retrieved	7	5
Formalized search strategies	'Newcastle disease' (full titles and enrichments) AND 'Wild birds' (interpretation of partial titles and enrichments)	'Newcastle disease' (full titles and enrichments) AND 'Wild birds' (full titles and enrichments)

FIG 7: *Search title: Newcastle disease in wild birds*

are impossibly scattered throughout the Chemical Substance Index, and the generic term is only used for general and review articles. The computer search, which probably had low absolute recall, was much more successful than the manual search as the word 'protein' is often mentioned in titles and keyword phrases even if specific proteins are concerned. Thus, the free-language entry points used in the computer search were of more use than *Chemical Abstracts* controlled specific indexing.

The manual searcher could only, in the search shown in Figure 6, search the MeSH thesaurus terms under which it had been decided to print items in *Index Medicus*; that is those which express the main points of each article. There were also too many specific terms for 'pesticides' for each one to be searched, so that the searcher had to infer this parameter from titles given under 'porphyria'. The Medline computer search could, however, use all the MeSH indexing applied to each item, and easily invoke all the narrower 'Pesticides' terms using Medline's hierarchical facility, hence its higher recall.

In the search detailed in Figure 7, the manual searcher was able to put his powers of interpretation to good use. 'Newcastle disease' items are grouped under this term in the *Bibliography of Agriculture Index*. The searcher could then

	MANUAL	ON-LINE
Database	*Bibliography of Agriculture*	AGRICOLA
Number of pertinent references retrieved	74	71
Formalized search strategies	'General plant science' (broad code) AND 'Conservation' (interpretation of full titles and enrichments)	'General plant science' (broad code), AND 'Conservation' (full titles and enrichments)

FIG 8: *Search title: Conservation of rare plants*

	MANUAL	ON-LINE
Database	*Bibliography of Agriculture*	AGRICOLA
Number of pertinent references retrieved	0	66
Formalized search strategies	No term in thesaurus	'Glyphosate' (full titles and enrichments)

FIG 9: *Search title: Glyphosate*

infer 'wild birds' from the titles of articles which contain the words 'Newcastle disease'. This advantage produced higher recall than the computer search, even though only part of the titles could be interpreted manually for the 1970–4 volumes because of restricted line lengths, as in *Biological Abstracts*. 'Wild birds' is impossible to express fully in free-language—all possible birds' names could not be included in the computer search, although the manual searcher could easily interpret them. Thus, in this search the manual searcher's use of interpretation outweighed the physical constraint of the printed index.

In this case (Figure 8) the manual search once again had slightly better recall because manual interpretation of a concept difficult to express for free-language computer searching was possible. Plant conservation is included in the section 'General Plant Science' in *Bibliography of Agriculture*. Fortunately, this section had few enough entries for the manual searcher to infer the conservation aspect from the titles given. The computer search could also use the 'General Plant Science' section code for one of its parameters, but 'conservation' had to be expressed in free-language, which was less successful than manual interpretation.

For the search in Figure 9, no subject approach was feasible in *Bibliography of Agriculture*, which uses a 'go-word' rather than a 'stop-word' list for computer production of its subject index—glyphosate was not in the go-word list. However, all substantive title words could be searched by computer, so that a very useful result was easily obtained, demonstrating the flexibility of free-language searching.

Although these examples are all of searches on agricultural topics and using databases of agriculture and related subject areas, it is evident that the principles they underline can be applied to any subject to be searched against any database in its printed or machine-readable forms. A detailed knowledge of the different entry points available in both forms, and of the layout of the printed indexes, is obviously vital to making an intelligent choice between the two procedures.

Choosing between the two procedures

How then can the searcher decide to use a database on-line or in its printed form? I suggest that he can ask himself some questions about the search topic, and the two forms of the database, and arrive at a sensible conclusion.

The first two questions concern the search topic:

1. What are the conceptual parameters of the topic?
2. Which of these are likely to be essential to isolate a manageable set of references with acceptably high precision?

Questions 3–7 concern the match between the search concepts and the entry points of the database in question:

3. What are the entry points available in the printed and machine-readable forms?
4. Are there any differences between these?
5. Can each essential search parameter be feasibly and adequately expressed in terms of the entry points available?
6. Can this be done more easily and/or adequately in one of the two forms?
7. Can the manual searcher use his powers of interpretation to infer concepts difficult to express otherwise? This is especially important if any of the essential parameters are difficult to express in the machine-readable form.

Questions 8–10 concern the physical constraints imposed on the manual searcher by the printed index layout:

8. Are the numbers of items under each candidate entry term small enough to scan within the time available?
9. Can the manual searcher feasibly co-ordinate between all the types of entry point required by the search? Usually this means that they need to be visible in one place in the index unless numbers of entries under the terms are low.
10. Does the physical format of the printed index mean that the searcher can only scan a limited number of terms per item in one place? This is common in KWIC indexes with restricted line lengths.

Finally, two general questions:

11. How much time is available? If there is little time, use the on-line version.
12. Is high recall vital? If so, use both procedures as each may uncover unique references.

The answers to these questions will give pointers to which procedure is likely to be the more successful. They have to be asked for each database considered for searching—it may be, as I have found, that for the same query a manual search could be better for one database, with an on-line search preferable for another. The aim is always to make the best use of the two options, to exploit their good points. For the manual search, this is the power of interpretation and for an on-line search, additional types of entry point and ease of co-ordination, the ability to scan many items, and the freedom from physical constraints of layout.

As on-line searching was obviously useful, as a result of the investigation it was decided to offer it as a routine service to Ministry staff. Wherever terminals are available, library and information staff have been trained to use them. The on-line searchers are thus those who would be providing manual searches, and are able to choose sensibly between the alternatives available and use printed sources whenever they seem more appropriate. Users without trained local searchers send their requests to the Ministry's Library Computer Services Centre at the Central Veterinary Laboratory, Weybridge. Eventually we hope that all Ministry staff will have access to a local searcher who can exploit the best points of both manual and on-line searching.

REFERENCE

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BLAISE—The British Library Automated Information Service

Brian Collinge

BLAISE Marketing,
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Paper presented at the Joint Annual Conference of the Aslib Midlands Branch and Northern Branch, Llandudno, 4th–6th May 1978

ONE OF THE PROBLEMS audiences face when hearing about computer systems is that of separating reality from enthusiastic speculation about future developments which may or may not materialize. This paper is almost entirely about systems and services which are already available and in every-day use. I hope to cover the whole range of BLAISE services and perhaps enable you to appreciate how the various individual features of BLAISE fit in to a total library service.

BLAISE

The BLAISE story began in April 1977 when the MEDLARS databases of the United States National Library of Medicine (NLM) were mounted on an IBM 370 series computer at Harlow in Essex. Users could now have on-line access to the files for information retrieval without having to use a transatlantic link. In October 1977 the MARC files were added, thus extending the range and quantity of data available and forming a 'general knowledge' information retrieval system which was entirely original.

The programs used for BLAISE, the ELHILL 3C package, are those developed by the NLM for MEDLARS over the last fifteen years. The advantages of being able to use tried and tested software are obvious and the first year of BLAISE's on-line service has not been compromised by 'bugs' appearing in the programs. Only minor amendments to the software were needed to enable us to mount the MARC files and the information retrieval system has been running happily for over a year. We have not, however, been relying solely on imported software. The British Library has also developed a package called the EDITOR which is complementary to ELHILL, and allows users to copy, amend and expand MARC records from the central source for use in their own catalogues. Users may also catalogue documents and create entirely new records at the terminal. The EDITOR has been operating experimentally since October 1977.

For those who are not familiar with on-line information systems perhaps just a couple of words of explanation are in order. What on-line means is that the user is able to interrogate directly the computer containing the information, via a terminal and a telephone line. The line can be dedicated to the service or be a normal telephone line in any office. It is this latter alternative, using ordinary telephones and dialling the computer's number, which BLAISE uses exclusively at the moment. The great advantage of on-line is that users get an immediate response to their searches and are able to change their strategy in the light of intermediate results. This means, for example, that if you get too many references you can refine the search further, say by date or language before having the results printed out. Printing of references is done either at the terminal if only a few references are required, or 'off-line' overnight at the computer centre. The results of off-line searches are sent by first-class post next day. Though they take a little longer to reach the user than receiving output on-line, they do cost less and so are attractive in cases where a large amount of information is retrieved in response to searches which are not extremely urgent.

Information available on BLAISE

I should like now to pass on to describe exactly what kind of information is available on BLAISE and how it can be retrieved. The MEDLARS files from the National Library of Medicine are already well known to users of on-line information retrieval systems:

(a) The MEDLINE file covers references to articles published in over 3,000 journals in the field of medicine and related disciplines. The articles are indexed, using a very carefully controlled vocabulary in the form of subject headings, by the National Library of Medicine and by co-operating MEDLARS centres outside the United States. The British MEDLARS centre is based at the British Library Lending Division in Boston Spa. The file is updated monthly and because of its carefully controlled structure, is very easy to use to good effect. Only the most recent data from the last three years is available for on-line searching. The rest, going back to 1966 can be searched off-line and the results mailed to the user next day in the form of off-line prints.

(b) TOXLINE is a composite database consisting of ten separate collections of secondary information in the field of toxicology and environmental pollution. TOXLINE is very heavily used indeed. Again only the recent records are available on-line. TOXBACK, which is searched off-line, include information dating from about 1940.

(c) CHEMLINE is not like the other files from the NLM stable, inasmuch as it does not contain bibliographic references. Its purpose is to enable users of TOXLINE to define chemical substances before beginning a search. For example, references to 'Berlin White' pollution might stump the searcher, but CHEMLINE would provide the Chemical Abstracts Registry number which uniquely identifies a substance and can be used in TOXLINE searching, as well as the information that the substance also goes under various other names, including Venetian White, Krems White, Silver White and Novade. At present the file contains descriptions and definitions of about 250,000 chemical substances.

(d) MARC. In describing the MARC files I should like to go in to a little

> more detail, for two reasons. First, the files themselves are entirely new and, unlike the MEDLARS files, are available only on BLAISE. Secondly, because of the very general, or rather universal, nature of the information they contain, the MARC files are likely to interest a section of the library community whose needs hitherto have not been well served by on-line systems and who may therefore be less familiar with the potential applications of such systems.

The information contained in the MARC files is not all new. It consists of the entire cumulated cataloguing effort of the British National Bibliography (BNB) since its foundation in 1950 and of the Library of Congress since the beginning of the MARC project in 1968. Though they contain no more than the catalogue entries than when they were produced, much more of that information is available for use in retrieval than would be possible in any traditional library catalogue. Most of the detail in a catalogue entry is only present for the information of the user *after* he has retrieved the record by a traditional browse under author's name, title, or classification number. The fact that he knows the publication date, the publisher's name or the subtitle of a book will not help him find it. In BLAISE, on the other hand, any scrap of bibliographic information is a potential search key.

Features of the ELHILL software permit the user to browse through the 'index' file alphabetically under author, titlewords, publisher, subject and so on so that uncertainty about spelling or authors' forenames need present no difficulty. The MARC files altogether contain nearly 1,500,000 records. They are divided into four separate files with a current and retrospective file of records from both the British Library and the Library of Congress.

There is an enormous amount of subject information on BLAISE using a variety of classification schemes and indexing systems so that the customer need not be stuck for choice.

Those familiar with the Dewey Decimal Classification will no doubt be glad to use it on BLAISE, but both Library of Congress class numbers and subject headings are also available. The UK Current MARC file also uses the PRECIS subject indexing system used to generate the indexes in the monthly issues and various cumulations of BNB since 1971. Being very specific, PRECIS offers the user of on-line an extremely efficient and detailed controlled vocabulary for subject searching. A more general search may be carried out taking advantage of the hierarchical structure of Dewey. A search using a general number can, at will, retrieve only items classed at that general number or can include all the more specific subjects represented by subordinate Dewey classes.

For all practical purposes there is no limit to the number of search terms which can be combined together to define a subject or a subject/author combination. In fact, any search term can be combined with any other in order to compile very individual bibliographies.

Catalogue Production

By combining a search on the MARC files with the use of the BLAISE EDITOR software it is possible, as mentioned earlier, to amend MARC records for local use. The system is really quite simple. A record, or in practice a number of records, are extracted from the MARC files by searching in the ordinary way, preferably using a control number such as ISBN or BNB number as search key, and the resulting MARC records are transferred by simple commands into the EDITOR. At this stage a preliminary editing process takes place. Few libraries will want to use all the information contained in MARC records in their catalogues. A 'filter' will systematically remove unwanted fields, according to the individual library's needs. There are a dozen ready-made filters available, or the user can specify his own quite simply. Once the records are copied into the EDITOR, they can be displayed in their full MARC format complete with tags, indicators, levels and subfield markers ready for further amendments. Existing fields can be amended or replaced; it may be, for example, that the British Library's classification may not meet with the library's approval and have to be changed. Completely new fields can be entered if necessary to cater for local information, such as holdings abstracts and for the inclusion of classification such as UDC, which is not generally available in the centrally produced records.

There are a number of reasons why a particular cataloguing record may not be available on the MARC files and in this eventuality the user can catalogue the document himself on-line. If required the EDITOR programs will prompt the cataloguer, asking for the various parts of the record, field by field, according to the format the user requires.

Having completed the editing procedures, which all take place in a subfile to which only the individual user has access, the finished records can be output in various ways. First, there is the on-line option which, because of telecommunications costs and connect charges, may not be the most economic form of output for large amounts of data. It is most useful for producing tailor-made bibliographies or reading lists by searching the MARC files by author or subject and adding any new records. The list can then be printed out on-line or off-line. The most significant forms of output from the BLAISE EDITOR are in machine-readable form.

It is a simple matter to have edited records including, of course, records input by the user, transferred to temporary storage and at the end of every month or every week turned into magnetic tapes in UK MARC format and sent to the library for use in its own catalogue production system.

The EDITOR can also be used by subscribers to the Local Catalogue Service (LOCAS) to prepare input for their catalogues. At the end of each on-line cataloguing session a simple command will have all the completed records, whether copied from the MARC files or created entirely from scratch, stored by the computer ready for inclusion in the next edition of the catalogue.

Major uses of BLAISE

The applications of BLAISE for information retrieval are obvious, perhaps, to those who have seen on-line information retrieval systems in action before. What is new about BLAISE is the ability to search the MARC files which have not been available in this form before. MEDLINE, CHEMLINE and TOXLINE may already be familiar, their reputation is established and most people who may have a use for them know at least something of them. MARC is an entirely new kind of database in a very new marketplace and so some of its applications may be unfamiliar. For this reason I am going to concentrate here on the role of on-line MARC in the services traditionally offered by a library to its user community. The suggestions I make are, of course, only suggestions; in something as new as this it is to be expected that precise applications may vary according to circumstances. My colleagues and I attempt to keep in close contact with BLAISE users in order that the experiences and discoveries of users can be shared by all.

1. Reader Services

I have already touched briefly on the information retrieval capabilities of BLAISE. The service can be used to compile reading lists for users and support SDI services. A search profile can be quickly drawn up and then applied to the entire file of nearly 1,500,000 MARC records or it can be stored and run every month, or even every week, against the most recent part of the file. Such a search would probably be a subject search, but BLAISE can just as easily perform one-off searches on authors, publishers and many other elements and combinations which would otherwise have to be turned away or would, at the very least, use up much staff time in the execution. It is perhaps in the field of reader services that the introduction of computer-based search services may be most significant. The implications may need some careful consideration for little work has been done in this country as to how such a service would be offered. Many seekers of information are not at all interested in how their requests are dealt with but some will be interested to know that a computer is being used. The librarian is faced with the problem of deciding whether the service is used as a back-room tool, or whether the terminal is installed in public view on the reference enquiry desk. We in BLAISE hope to reap the benefit of our customers' experiences and draw some conclusions soon for the information of all.

2. Acquisitions

BLAISE not only has the widest coverage of any acquisition aid, but it also contains the greatest amount of detail on which to base the decision to buy an item or not. All the detail of BNB is present on the UK MARC files, for example, plus the indexing information provided by PRECIS. All the files include information on subject, price, edition and addresses of obscure publishers. A college library which is suddenly called upon to support a new course of instruction can very quickly and easily supply their bookseller with a list of desiderata with which to fill the new shelves. The stock editor too could use the MARC files to provide him with regular lists of material which may need withdrawal or reallocation to a reserve collection.

With the growth of the Cataloguing in Publication programme and improvements in the currency of BNB cataloguing, BLAISE could provide the information on which to base a sophisticated book ordering and combined cataloguing system.

3. Inter-library loans

An increasingly attractive alternative to buying a book is to try to borrow it from your neighbour. Anyone who has worked in an inter-library loans section will be aware that often colleagues in other libraries will try to borrow a book they have been unable to trace. It could be that the problem is caused by in correct or otherwise inadequate information; requesting libraries sometimes have the most eccentric opinions as to what constitute useful bibliographic tracing details. BLAISE is able to use information in a search which may not be of value in searching a traditional library catalogue.

Loans from the British Library Lending Division (BLLD) at Boston Spa, which already has a reputation for speedy service, will be made even quicker by the introduction of the BLAISE Document Request Service. The subscriber will identify a document by searching on any of the BLAISE files and can then ask to borrow the document or a copy of it from the BLLD simply by typing in a series of simple commands and the number of a BLLD coupon. Staff at Boston Spa will thus receive the request much more quickly and without risk of transcription errors or inadequate tracing information, since they will have the complete BLAISE record if they require it.

Eventually, as use of the EDITOR grows, more and more libraries will contribute to the union catalogue function of BLAISE. What happens is briefly as follows: libraries cataloguing on-line via the EDITOR are asked whether the records they have just been editing or creating can be treated as holdings. If they agree, a code identifying the library will be added to those records in the main file. Libraries creating records where none previously existed in the file will be asked to allow their created records to be used by BLAISE to enrich the database. This will take place overnight, following a checking procedure, and the new records will be present next day on the database for use in both information retrieval and shared cataloguing by other libraries.

Obviously the usefulness of BLAISE as a union catalogue will grow as the amount of holdings information grows. At the moment the holdings of the British Library Reference Division are included in records for documents catalogued since 1976. In the case of the Department of Printed Books the actual shelfmark is given and includes the information that a given item is stored at the Woolwich Repository and will therefore be available only at 24 hours' notice. Eventually the holdings details of other libraries of national status will be added. It may be of interest here to describe how the libraries of the various colleges and institutes of the University of London will use BLAISE as a union catalogue. The various individual libraries are to have their catalogue produced and maintained by the Local Catalogue Service but the University will not have a union catalogue of its own. Instead all the holdings information of the University's libraries will be included in the main MARC file on BLAISE and so the University will, in effect, have access to an on-line union catalogue.

4. Support of local systems

With the development of suitable hardware, notably high-speed links, BLAISE can be used to support the computer-based system of either individual libraries or a co-operative working on behalf of a number of such libraries. An automated circulation control system, for example, need not store entire MARC records since normally a control number and a reader number will be enough. The need for bibliographic information such as author and title will not materialize in the majority of transactions as books are returned to the library and loans discharged. When it comes to sending out reminder notices to the delinquent minority the authors and titles of the books in question could be extracted from the BLAISE files using a list of control numbers. The link would, of course, be completely mechanized. This example is a simple one, but the ability to link computers to control book ordering, cataloguing and circulation is one of the most interesting directions in which automation in libraries is developing.

Subscription to BLAISE

I have described BLAISE on-line, how it works and what it does. I should like now to speak briefly about how to belong. BLAISE on-line services are available only to subscribers. A subscription costs £25 per annum and includes the BLAISE User Manual, the monthly BLAISE Newsletter and other documentation.

In addition to a subscription, potential users will need a suitable terminal. This particular piece of hardware is becoming a common feature of many offices and is no longer the outlandish piece of apparatus it once was. There is, of course, a large range of equipment available but terminals which work for other commonly available information systems will also work on BLAISE. The simplest kind of terminal costs in the region of £600, but it is possible to spend a great deal more than that on sophisticated equipment with local storage and processing capabilities which may be desirable depending on the use to which it is to be put. Although BLAISE works at the comparatively low speed of thirty characters per second, this is still much faster than anyone can type and so the ability to enter data off-line to a local memory before dialling BLAISE will certainly be an advantage to those planning to catalogue via the terminal.

The various files on BLAISE are easy enough to use for information retrieval but we do recommend training for operators. In the case of catalogue production using the EDITOR, we insist that operators undergo a BLAISE training course. These courses are available at a reasonable price to all BLAISE subscribers. We recommend them and it is fair to say that attendees of past courses also recommend them.

With the subscription taken out and the terminal installed the use of BLAISE is paid for by the hour according to one of three tariffs.* The basic price of BLAISE use is £25 per hour, but this is reduced to £20 per hour when the subscriber pays for 50 hours (or £1,000) in advance. There is an intermediate rate of £23 per hour when £100 is required in advance. Small additional charges are made for off-line prints and other sundries.

A high proportion of the total cost of on-line services is spent on telecommunications. At present a long-distance call at the highest tariff adds about £12 per hour to the final bill. In order to establish more reliable and cheaper telecommunications BLAISE is introducing in major centres in the UK a series of nodes. At present nodes operate in Birmingham, Edinburgh, London and Manchester, with future nodes already planned for Bristol and Boston Spa.

*Priced as at May 1978.

In due course over a third of our existing users will have local call access to BLAISE via the network and as BLAISE use spreads we also expect to extend the network to other centres.

Despite extremely high international telephone costs BLAISE already has over sixty subscribers outside this country, including a handful outside Europe. When the EURONET system come into operation in 1979 we expect to increase this number dramatically as telecommunications costs fall.

The future

This, then, is the position we are in at the moment. I have, as I promised, spoken almost exclusively about the services we are able to offer here and now. I should now like to describe a few of the plans we have for the immediate future. BLAISE is still very young and our immediate aim is to make it attractive to as many people as possible. We are fortunate that as part of the British Library we have access to vast amounts of bibliographic data which would, if it could be made available, complement the MARC data we already have on-line. The Department of Printed Books in the British Library Reference Division acquires by right all books published in the United Kingdom and the cataloguing records of these books have, since 1975, formed the basis of BNB and the MARC file. The Department also acquires by purchase, exchange and donation, vast quantities of foreign books to which it has no copyright entitlement. These have been catalogued in machine-readable form since 1975 and we expect to include them on the UK Current MARC file quite soon. This will mean that the foreign books already included in the Library of Congress MARC file on BLAISE will be complemented by the British National collection.

An even more daunting enterprise is the eventual conversion of the august *British Museum General Catalogue of Printed Books* to machine-readable form. Feasibility studies using computer-input microfilm are at present being undertaken and we hope that if the outcome is positive to make the resulting database available on BLAISE. We would then have the ability to search a database stretching from the earliest times to the present day, from the Gutenberg Bible to the contents of next week's BNB!

The International Serials Data System will, it is hoped, choose BLAISE for its international periodicals file. The British National Serials Data Centre file will in any case, be available on BLAISE as part of the UK Current file. The Library of Congress Serials File is already well advanced and we expect to have it available by the end of this year as part of the LC Current file. Difficulties over the display of the very complicated holdings information mean that consideration of a union file of serials will have to wait for the production of an agreed format. Records representing serials will, however, be able to contain holdings information as part of the shared cataloguing supplied by users. We hope to have an on-line successor to the British Union Catalogue of Periodicals ready to take over from BUCOP when its present incarnation ceases in 1980.

Other files in the field of humanities which we hope we will be able to mount on BLAISE are the *British Education Index* and the *British Catalogue of Music*.

Our plans for new databases do not, however, allow us to ignore the development of biomedical files and they will be enhanced by the mounting first of the

Registry of Toxic Effects of Chemical Substances (RTECS) from the National Library of Medicine. This file is a natural partner for the TOXLINE file. We also hope to have CANCERLINE from the National Cancer Institute in Washington DC available on-line before very long.

Conclusion

We have other future plans too, but perhaps I should stay with the established facts of BLAISE. The system was born in a very short time indeed—scarcely a years from conception to parturition—and it was brought rather gingerly into the world. It was to be an interim solution to allow the library and information community in this country to gain experience in the administration and use of on-line systems. BLAISE has now been adopted as the name for all the British Library's computer-based services, including the ICL-based library package which we are developing and which is called MERLIN, instead of merely being a stop gap.

At present nearly 300 organizations use BLAISE on-line services and the growth is continuing apace. Many of these users were previously unfamiliar with the kind of facilities offered by BLAISE. The system is still developing but after a year its future is secure. An on-line user community is rapidly forming with a wide field of interests. I think we can conclude that the enterprise has been successful.

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